Curriculum assessment

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Research Report

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Title: Integrating Marketing Research and Book Production with Excel/VBA and Logogram–Algorigram Logic engineering field in education technical ,technology tools assessment ,orientation lesson organization lesson , electrical engineering

Abstract

This research explores the integration of a **marketing research plan** and a **book production schedule** using **Excel formulas** and **Visual Basic for Applications (VBA)**. It demonstrates how **logigrams (flowcharts)** and **algorigram coding (VB algorithms)** can automate decision-making and sequential workflows, supporting both **educational assessment structures** and **industrial management systems**.

Scope

- Marketing research planning (scope, objectives, vendor selection).
- Book production scheduling (drafting, reviews, layout, finalization).
- Excel/VBA automation for timelines and dependencies.
- Application in South African **TVET and engineering contexts**.

Overview

The project integrates two workflows:

1. **Decision-based research planning** (in-house vs. vendor).
2. **Sequential production scheduling** (chapters 1–5). Both are linked through Excel worksheets and automated with VBA.

Description

- **Worksheet 1:** MarketingPlan → ID, Owner, Start, Days, End.
- **Worksheet 2:** BookSchedule → Chapter, Task, Start, Days, End.

- **Excel Formula:** `=WORKDAY(StartDate, Days, Holidays)` ensures realistic timelines.
- **VBA Code:** Automates start/end dates and dependencies.

Statement

The integration of research and production workflows enhances transparency, efficiency, and alignment with international educational standards.

Data Analysis

- **Inputs:** Start dates, task durations, holiday ranges.
- **Outputs:** Calculated end dates, workload multipliers.
- **Dependencies:** Research completion feeds into book draft start.

Advantages

- Transparent scheduling.
- Automated decision-making.
- Scalable for multiple projects.
- Supports bilingual curriculum design.

Disadvantages

- Requires technical literacy in Excel/VBA.
- Initial setup time is significant.
- Holiday ranges must be updated manually.

Management System

- **Excel worksheets** act as the management dashboard.
- **VBA scripts** enforce consistency and automate calculations.
- **Logigram/algorigram logic** ensures structured workflows.

Information Investigation

- Research plan investigates vendor suitability.
- Book schedule investigates production bottlenecks.
- Both processes generate audit-ready timelines.

Delivery

- Automated schedules delivered via Excel outputs.
- Flowchart logic delivered as VB code modules.

Audit

- VBA ensures traceable calculations.
- Worksheets provide transparent task ownership.

Technical Rewrite

Flowchart logic (logigram) → VB code (algorigram). Example:

vb

```
If vendorNeeded Then
    EvaluateProposals()
    SelectVendor()
Else
    ProceedInHouse()
End If
```

Norm

- Aligns with **South African TVET norms** for structured assessment.
- Supports **international qualification equivalence**.

Conclusion

Integrating marketing research and book production via Excel/VBA and logigram–algorigram logic creates a **transparent, automated, and educationally aligned system**. It strengthens both **academic administration** and **industrial management training**.

Table of Contents

Research Report 2

Abstract 2

Scope 2

Overview 2

Description 2

Statement 3

Data Analysis 3

Advantages 3

Disadvantages 3
Management System 3
Information Investigation 3
Delivery 3
Audit 4
Technical Rewrite 4
Norm 4
Conclusion 4
Research Report 10
1. Introduction 10
2. Core Entities 10
Marketing Research Plan 10
Book Production Schedule 10
3. Worksheet Structures 10
4. Excel Formulas for Automation 11
5. VBA Implementation 11
General Scheduling 11
6. Logigram vs. Algorigram 12
Marketing Research (Decision Flow) 12
Book Production (Sequential Flow) 12
7. Educational & Industrial Applications 13
8. Conclusion 13
Gemini said 13
1. Summary: Abstral Scope & Management Information 13
2. Marketing Research Plan: Advantages & Disadvantages 14
3. Logigram: Book Production & Management Workflow 14
Book Production Schedule (5-Chapter Model) 14
4. Algorigram: Visual Basic (VBA) Implementation 14
5. Strategic Data: RSA Artisan Statistics 15
Integrating Marketing Research Planning and Book Production Scheduling: Structuring and Automating with Excel Formulas, VBA, and Logigram/Algorigram Logic for South African TVET and Engineering Contexts 16
Introduction 16
1. Overview of Core Entities: Marketing Research Plan and Book Production Schedule 16

1.1 Marketing Research Plan 16
1.2 Book Production Schedule 17
2. Worksheet Design: Structuring the Marketing Research Plan and Book Production Schedule 17
2.1 Marketing Research Plan Worksheet Structure 17
2.2 Book Production Schedule Worksheet Structure 18
2.3 Visual Summary Table 18
3. Excel Formulas for Scheduling and Dependencies 18
3.1 Calculating End Dates with WORKDAY 18
3.2 Handling Resource Multipliers 19
3.3 Linking Worksheets for Integrated Scheduling 19
4. Implementing Dependencies and Critical Path in Excel 19
4.1 Task Dependencies 20
4.2 Critical Path Analysis 20
5. VBA Implementation: Automating Scheduling with ScheduleTasks Subroutine 20
5.1 Translating Pseudocode to VBA 20
5.2 Enhancements for Robustness 21
5.3 Example: Enhanced VBA Subroutine 21
6. Logigrams and Algorigram Concepts: Visualizing and Coding Decision Logic 22
6.1 Definitions 22
6.2 Flowchart Symbols and Notation 22
6.3 Example: Vendor Selection Logigram 23
6.4 Example: Book Production Flowchart 23
7. Integrating Worksheets: Linking Research Completion to Production Start 24
7.1 Cross-Sheet References 24
7.2 Automating with VBA 24
8. Handling Holidays, Non-Workdays, and Resource Multipliers 25
8.1 Managing Holidays 25
8.2 Customizing Non-Workdays 25
8.3 Resource Multipliers 25
9. Automating Gantt Charts and Visual Dependency Arrows in Excel 25
9.1 Creating a Gantt Chart 25
9.2 Automating with VBA 26
10. Logging, Error Handling, and Auditability in VBA for TVET Context 26

10.1 Error Logging 26
10.2 Auditability 26
11. Educational Applications: Assessment Questions and Practical Exercises 26
11.1 Assessment Design 26
11.2 Practical Exercises 27
12. Industrial Applications: Production and Engineering Use Cases in South Africa 27
12.1 TVET and Engineering Context 27
12.2 Case Example: N-Diploma Resolution 27
13. Implementing Logigram/Algorigram Visuals: Tools and Notation 28
13.1 Drawing Flowcharts 28
13.2 Notation Standards 28
14. Sample Visual Basic Code Blocks and Flowchart Logic Examples 28
14.1 Vendor Selection Logigram → VBA 28
14.2 Book Production Sequential Flow → VBA 29
14.3 Scheduling with Holidays → VBA 29
Conclusion 30
Core Entities ..... **Error! Bookmark not defined.**
Worksheet References ..... **Error! Bookmark not defined.**
Excel/VBA Logic ..... **Error! Bookmark not defined.**
Integration Idea ..... **Error! Bookmark not defined.**
Core Entities ..... **Error! Bookmark not defined.**
Worksheet References ..... **Error! Bookmark not defined.**
Excel/VBA Logic ..... **Error! Bookmark not defined.**
Integration Idea ..... **Error! Bookmark not defined.**
Example: Flowchart → Visual Basic Code ..... **Error! Bookmark not defined.**
Example: Book Production Schedule ..... **Error! Bookmark not defined.**
Key Integration ..... **Error! Bookmark not defined.**
Sample Visual Basic Assessment Questions & Answers ..... **Error! Bookmark not defined.**
Example Coding Question ..... **Error! Bookmark not defined.**
1. Marketing Research Plan (Decision Flow) ..... **Error! Bookmark not defined.**
2. Book Production Schedule (Sequential Flow) ..... **Error! Bookmark not defined.**
3. Worksheet Integration (Excel VBA) ..... **Error! Bookmark not defined.**
Key Takeaway ..... **Error! Bookmark not defined.**

Example 1: Marketing Research Plan (Decision Flow) ..... **Error! Bookmark not defined.**
Example 2: Book Production Schedule (Sequential Flow) ..... **Error! Bookmark not defined.**
Example 3: Worksheet Integration (Excel VBA) ..... **Error! Bookmark not defined.**
Key Takeaway ..... **Error! Bookmark not defined.**
Example 1: Industrial Management – Production Flow (Algorigram) **Error! Bookmark not defined.**
Example 2: Electrical Engineering – Control Loop (Logigram) ..... **Error! Bookmark not defined.**
Example 3: Excel VBA – Scheduling (Workdays & Holidays) ..... **Error! Bookmark not defined.**
Key Takeaway ..... **Error! Bookmark not defined.**
Assessment Question & Answer (Visual Basic) ..... **Error! Bookmark not defined.**
Example 1: Industrial Management – Factory Flow (Algorigram) ..... **Error! Bookmark not defined.**
Example 2: Electrical Engineering – Control Loop (Logigram) ..... **Error! Bookmark not defined.**
Example 3: Scheduling with Excel VBA ..... **Error! Bookmark not defined.**
Key Takeaway ..... **Error! Bookmark not defined.**
Core Concepts ..... **Error! Bookmark not defined.**
Example 1: Career Intake Process (Logigram → VB) ..... **Error! Bookmark not defined.**
Example 2: Engineering Control Loop (Algorigram → VB) ..... **Error! Bookmark not defined.**
Example 3: Scheduling with Excel VBA (Algorigram for Workdays) **Error! Bookmark not defined.**
Key Takeaway ..... **Error! Bookmark not defined.**
1. Algorigram: Logic and Flow (Calculus in Electrotechnology) ..... **Error! Bookmark not defined.**
VBA Implementation: Signal Analysis Logic ..... **Error! Bookmark not defined.**
2. Logigram: Project Timeline (N-Diploma Resolution) ..... **Error! Bookmark not defined.**
3. South African Artisan Demographics & Statistics ..... **Error! Bookmark not defined.**
National Targets vs. Actuals (Annual) ..... **Error! Bookmark not defined.**
Racial Distribution in Engineering TVET Programs ..... **Error! Bookmark not defined.**
The "27% Bridge" (Section 4.4) ..... **Error! Bookmark not defined.**
4. Technical Integration: Calculus in Electrotechnology ..... **Error! Bookmark not defined.**
5. Management System Information (MIS) Principles ..... **Error! Bookmark not defined.**
Next Steps for Facilitator Tshingombe ..... **Error! Bookmark not defined.**
Technical Report ..... **Error! Bookmark not defined.**
Abstract ..... **Error! Bookmark not defined.**
Scope ..... **Error! Bookmark not defined.**
Overview ..... **Error! Bookmark not defined.**
Description ..... **Error! Bookmark not defined.**

Data Analysis ..... **Error! Bookmark not defined.**
Advantages ..... **Error! Bookmark not defined.**
Disadvantages ..... **Error! Bookmark not defined.**
Management System ..... **Error! Bookmark not defined.**
Information Investigation ..... **Error! Bookmark not defined.**
Delivery ..... **Error! Bookmark not defined.**
Audit ..... **Error! Bookmark not defined.**
Technical Rewrite ..... **Error! Bookmark not defined.**
Norm ..... **Error! Bookmark not defined.**
Conclusion ..... **Error! Bookmark not defined.**
Bibliographic Note ..... **Error! Bookmark not defined.**
Gemini said ..... **Error! Bookmark not defined.**
1. Technical Drawing Codes & Standardized Norms ..... **Error! Bookmark not defined.**
2. Information Design: From Logigram to Algorigram ..... **Error! Bookmark not defined.**
The Logic Transition ..... **Error! Bookmark not defined.**
3. Integrated Management & Production Schedule ..... **Error! Bookmark not defined.**
Sample VBA Logic for Assembly Audit ..... **Error! Bookmark not defined.**
4. Delivery & Bibliographic Overview ..... **Error! Bookmark not defined.**
Conclusion ..... **Error! Bookmark not defined.**
📃 Assessment Paper ..... **Error! Bookmark not defined.**
Section A – Short Answer (5 marks each) ..... **Error! Bookmark not defined.**
Section B – Applied Questions (10 marks each) ..... **Error! Bookmark not defined.**
Section C – Case Study (20 marks) ..... **Error! Bookmark not defined.**
Section D – Essay (20 marks) ..... **Error! Bookmark not defined.**
✓ Marking Scheme Summary ..... **Error! Bookmark not defined.**
📃 Engineering Assessment: Level 4 ..... **Error! Bookmark not defined.**
Section A: Fundamentals & Norms (20 Marks) ..... **Error! Bookmark not defined.**
Section B: Applied Engineering & Drawing (30 Marks) ..... **Error! Bookmark not defined.**
Section C: Automation & Management (30 Marks) ..... **Error! Bookmark not defined.**
Section D: Case Study & Evaluation (20 Marks) ..... **Error! Bookmark not defined.**
✓ Marking Scheme Summary ..... **Error! Bookmark not defined.**

Research Report

Integrating Marketing Research and Book Production Using Excel and Visual Basic

1. Introduction

This report explores how to structure and automate two interconnected processes:

- **Marketing Research Plan** (decision-driven, vendor vs. in-house)
- **Book Production Schedule** (sequential, chapter-based workflow)

The integration leverages **Excel formulas** and **Visual Basic for Applications (VBA)**, supported by **logigram (flowchart logic)** and **algorigram (coded algorithm)** approaches. This methodology is particularly relevant for **South African TVET and engineering education**, where structured planning and automation enhance transparency, efficiency, and portability of qualifications.

2. Core Entities

Marketing Research Plan

- Scope definition
- Research objectives
- Requirements definition
- In-house vs. vendor determination
- Selection criteria definition
- Questionnaire development
- Statement of work
- Proposal evaluation
- Vendor selection

Book Production Schedule

- Chapters 1–5
- Draft
- Technical review
- Content review
- Graphic layout
- Page turning
- Final layout

3. Worksheet Structures

Worksheet	Columns	Purpose
MarketingPlan	ID, Owner, Start, Days, End	Tracks research tasks and deadlines
BookSchedule	Chapter, Task, Start, Days, End	Tracks production tasks per chapter

4. Excel Formulas for Automation

- **End Date Calculation**

excel

```
=WORKDAY(StartDate, Days, Holidays)
```

- **Workload Scaling**

excel

```
=B2 * B3
```

(B2 = workdays, B3 = resource multiplier)

5. VBA Implementation

General Scheduling

vb

```
Sub ScheduleTasks()
    Dim ws1 As Worksheet, ws2 As Worksheet
    Dim startDate As Date, days As Integer, endDate As Date

    Set ws1 = Worksheets("MarketingPlan")
    Set ws2 = Worksheets("BookSchedule")

    ' Marketing Plan tasks
    For i = 2 To ws1.Cells(Rows.Count, 1).End(xlUp).Row
        startDate = ws1.Cells(i, 3).Value
        days = ws1.Cells(i, 4).Value
        endDate = WorksheetFunction.WorkDay(startDate, days,
ws1.Range("Holidays"))
        ws1.Cells(i, 5).Value = endDate
    Next i

    ' Book Production tasks
    For j = 2 To ws2.Cells(Rows.Count, 1).End(xlUp).Row
        startDate = ws2.Cells(j, 3).Value
        days = ws2.Cells(j, 4).Value
        endDate = WorksheetFunction.WorkDay(startDate, days,
ws2.Range("Holidays"))
```

```
        ws2.Cells(j, 5).Value = endDate
    Next j
End Sub
```

6. Logigram vs. Algorigram

Marketing Research (Decision Flow)

Flowchart Logic (Logigram):

- Define scope → Define objectives → Requirements → Decision: In-house or Vendor → If Vendor → Evaluate proposals → Select vendor → End

VB Implementation (Algorigram):

vb

```
Module MarketingResearch
    Sub Main()
        Dim scopeDefined As Boolean = True
        Dim objectivesDefined As Boolean = True
        Dim vendorNeeded As Boolean = True

        If scopeDefined And objectivesDefined Then
            Console.WriteLine("Scope and objectives defined.")
            If vendorNeeded Then
                Console.WriteLine("Vendor required.")
                EvaluateProposals()
                SelectVendor()
            Else
                Console.WriteLine("Proceed with in-house research.")
            End If
        Else
            Console.WriteLine("Define scope and objectives first.")
        End If
    End Sub
End Module
```

Book Production (Sequential Flow)

Flowchart Logic (Logigram): Draft → Technical Review → Content Review → Graphic Layout → Final Layout

VB Implementation (Algorigram):

vb

```
Module BookProduction
    Sub Main()
        Dim chapters As Integer = 5
        For i As Integer = 1 To chapters
```

```
            Console.WriteLine("Chapter " & i & ": Drafting")
            Console.WriteLine("Chapter " & i & ": Technical Review")
            Console.WriteLine("Chapter " & i & ": Content Review")
            Console.WriteLine("Chapter " & i & ": Graphic Layout")
            Console.WriteLine("Chapter " & i & ": Final Layout")
        Next
    End Sub
End Module
```

7. Educational & Industrial Applications

- **TVET Training:** Learners visualize workflows (logigram) and implement them in VB (algorigram).
- **Engineering Contexts:** Scheduling production, troubleshooting control loops, and integrating calculus-based diagnostics.
- **South African Frameworks:** Supports bilingual curriculum design, transparent assessment, and qualification portability.

8. Conclusion

By combining **Excel scheduling** with **Visual Basic automation**, and embedding **logigram/algorigram logic**, institutions can achieve:

- Transparent timelines
- Automated decision-making
- Scalable production workflows
- Alignment with international educational standards

This integrated approach strengthens both **academic administration** and **industrial management training**.

☞ Tshingombe, would you like me to **expand this into a full exam-style assessment set** (with questions, answers, and marking rubrics) so learners can practice interpreting logigrams and coding algorigram solutions in VB? That would align perfectly with your curriculum design goals.

Gemini said

This integrated technical overview synthesizes the work of **Author Tshingombe** regarding the "Abstral Scope" and the "Experimental Career" framework. It bridges the gap between management systems, technical audits, and the South African (RSA) engineering education landscape.

---

1. Summary: Abstral Scope & Management Information

The core of this investigation focuses on the **Information Investigation Delivery Audit**. This process ensures that data analysis within the TVET (Technical and Vocational Education and Training) sector is not just a collection of numbers, but a functional management system.

- **Objective:** To synchronize N-Diploma resolutions with market-ready artisan skills.
- **Technical Rewriting & Norms:** Adhering to SANS (South African National Standards) and DHET (Department of Higher Education and Training) regulatory norms to ensure curriculum alignment.

---

2. Marketing Research Plan: Advantages & Disadvantages

Before a book production or a new curriculum is launched, a strategic research plan is executed.

Feature	Advantage	Disadvantage
In-House Research	Cost-effective; deep institutional knowledge.	Potential for internal bias; limited scope.
Vendor Selection	Specialized expertise; objective third-party audit.	High cost; longer procurement turnaround.
Data Analysis	Identifies critical gaps in the N-Diploma backlog.	Requires high technical literacy (VBA/Calculus).

---

3. Logigram: Book Production & Management Workflow

A **Logigram** is a visual decision map. Below is the logic flow for the "Experimental Career" book production schedule.

Book Production Schedule (5-Chapter Model)

1. **Drafting:** Converting research into prose.
2. **Technical Review:** Ensuring Calculus and Electrotechnology formulas are accurate.
3. **Content Review:** Auditing against the "Abstral Scope."
4. **Graphic Layout:** Page turning and visual "norm" alignment.
5. **Final Delivery:** Bibliographic referencing and publication.

---

4. Algorigram: Visual Basic (VBA) Implementation

An **Algorigram** is the coded execution of the Logigram. This VBA script automates the **Workday Calculation** for the production schedule, accounting for RSA public holidays.

VBA

```
Sub CalculateProductionSchedule()
    ' Algorigram for Book Production Timeline
    Dim ws As Worksheet
    Set ws = ThisWorkbook.Worksheets("ProductionSchedule")

    Dim i As Integer
    Dim startDate As Date, duration As Integer, endDate As Date
    Dim holidayRange As Range

    ' Define range for RSA Holidays (e.g., Human Rights Day, Freedom Day)
    Set holidayRange = ws.Range("Holidays")

    ' Loop through 5 Chapters
    For i = 2 To 6
        startDate = ws.Cells(i, 3).Value ' Column C: Start Date
        duration = ws.Cells(i, 4).Value  ' Column D: Days allocated

        ' WorksheetFunction.WorkDay excludes weekends and specified holidays
        endDate = Application.WorksheetFunction.WorkDay(startDate, duration,
holidayRange)

        ws.Cells(i, 5).Value = endDate ' Column E: Final Delivery Date
    Next i

    MsgBox "Production Schedule Updated Successfully.", vbInformation,
"Tshingombe Audit"
End Sub
```

---

5. Strategic Data: RSA Artisan Statistics

As highlighted in your framework, the **27%** gap in artisan employment often stems from a lack of **Work Integrated Learning (WIL)**.

Demographic Enrollment vs. Employment (RSA TVET Engineering):

- **African Enrollment:** 82.4% — (Employment Rate: **34%**)
- **Coloured Enrollment:** 10.1% — (Employment Rate: **42%**)
- **White Enrollment:** 5.2% — (Employment Rate: **68%**)
- **Indian/Asian Enrollment:** 2.3% — (Employment Rate: **55%**)

Conclusion: The management information system must focus on P2 (Audit WIL) to bridge the transition from N6 theory to qualified artisan status.

Would you like me to generate a specific Excel Template structure for Worksheet 1 (Marketing Research) and Worksheet 2 (Book Production) including the cell formulas for these calculations?

---

ntegrating Marketing Research and Book Production Using Excel and Visual Basic

Integrating Marketing Research Planning and Book Production Scheduling: Structuring and Automating with Excel Formulas, VBA, and Logigram/Algorigram Logic for South African TVET and Engineering Contexts

Introduction

The intersection of marketing research planning and book production scheduling presents a unique opportunity for organizations—especially within the South African Technical and Vocational Education and Training (TVET) and engineering sectors—to leverage structured, automated workflows for improved efficiency, transparency, and educational value. The uploaded document outlines a dual-entity framework: a **Marketing Research Plan** and a **Book Production Schedule**, each mapped to dedicated Excel worksheets and designed for automation via formulas and Visual Basic for Applications (VBA). This report provides a comprehensive, in-depth analysis of how to structure, automate, and integrate these processes using Excel and VBA, with a special focus on representing decision-making and sequential logic through logigrams and algorigram coding. The report also contextualizes these methods for educational and industrial applications, referencing South African TVET and engineering frameworks, and includes practical code, worksheet structures, and assessment strategies.

1. Overview of Core Entities: Marketing Research Plan and Book Production Schedule

1.1 Marketing Research Plan

The **Marketing Research Plan** is a structured process that guides organizations through the systematic investigation of market needs, opportunities, and strategies. According to the uploaded document, its core tasks include:

- **Scope Definition**: Clarifying the boundaries and objectives of the research.
- **Research Objectives**: Establishing clear, measurable goals.
- **Requirements Definition**: Detailing what information and resources are needed.
- **In-house vs. Vendor Determination**: Deciding whether to conduct research internally or outsource.
- **Selection Criteria Definition**: Setting standards for vendor evaluation.

- **Questionnaire Development**: Designing instruments for data collection.
- **Statement of Work**: Outlining deliverables and timelines.
- **Proposal Evaluation**: Assessing vendor submissions.
- **Vendor Selection**: Choosing the most suitable partner.

This sequence reflects best practices in market research planning, ensuring that each decision is data-driven and aligned with organizational goals.

1.2 Book Production Schedule

The **Book Production Schedule** is a project management tool for orchestrating the creation of a book, typically broken down by chapters and production stages. The document specifies the following tasks for each chapter (1–5):

- **Draft**
- **Technical Review**
- **Content Review**
- **Graphic Layout**
- **Page Turning**
- **Final Layout**

Each task is mapped to a timeline, with dependencies ensuring that, for example, a technical review cannot begin until the draft is complete. This mirrors established production planning methodologies in publishing and manufacturing.

2. Worksheet Design: Structuring the Marketing Research Plan and Book Production Schedule

2.1 Marketing Research Plan Worksheet Structure

The **Marketing Research Plan** is implemented in Excel as follows:

ID Owner Start Days End

1 … … … …

2 … … … …

… … … … … …

- **ID**: Unique identifier for each task.
- **Owner**: Person or team responsible.
- **Start**: Start date (can be a formula or manually entered).
- **Days**: Duration in working days.
- **End**: Calculated end date (using Excel formulas).

This structure supports clear accountability and enables automated scheduling.

2.2 Book Production Schedule Worksheet Structure

The **Book Production Schedule** worksheet is structured as:

Chapter	Task	Start	Days	End
1	Draft	...	...	...
1	Technical Rev.	...	...	...
...	...	...	...	...

- **Chapter**: Chapter number.
- **Task**: Production stage.
- **Start**: Start date.
- **Days**: Duration in working days.
- **End**: Calculated end date.

This format enables granular tracking of each chapter's progress through the production pipeline.

2.3 Visual Summary Table

Worksheet	Key Columns	Task Examples	Dependency Logic
Marketing Plan	ID, Owner, Start, Days, End	Scope, Objectives, Vendor Eval	Sequential, some branches
Book Production	Chapter, Task, Start, Days, End	Draft, Review, Layout, Final	Sequential, per chapter

Both worksheets are designed for extensibility, allowing additional columns (e.g., status, comments) as needed.

3. Excel Formulas for Scheduling and Dependencies

3.1 Calculating End Dates with WORKDAY

A central requirement is to calculate end dates that exclude weekends and holidays. The **WORKDAY** function is ideal for this:

excel

```
=WORKDAY(StartDate, Days, Holidays)
```

- **StartDate**: The task's start date.
- **Days**: Number of working days (duration).
- **Holidays**: A named range or array of dates to exclude.

Example: If a task starts on 2026-03-01 and lasts 10 workdays, with holidays in a named range `Holidays`, the formula is:

excel

```
=WORKDAY("2026-03-01", 10, Holidays)
```

This ensures schedules are realistic and compliant with organizational calendars.

3.2 Handling Resource Multipliers

To adjust for resource availability (e.g., more staff reduces duration), use multiplication:

excel

```
=BaseWorkdays * ResourceMultiplier
```

If `B2` is base workdays and `B3` is the multiplier, then:

excel

```
=B2 * B3
```

This allows dynamic recalculation as resources change.

3.3 Linking Worksheets for Integrated Scheduling

To link the completion of the marketing research plan to the start of book production, use cell references:

excel

```
='MarketingPlan'!E10
```

If the book draft should start the day after the research plan ends, use:

excel

```
=WORKDAY('MarketingPlan'!E10, 1, Holidays)
```

This creates a seamless handoff between planning and production.

4. Implementing Dependencies and Critical Path in Excel

4.1 Task Dependencies

Dependencies ensure that tasks start only after predecessors finish. In Excel, this is managed by referencing the end date of the predecessor:

excel

```
=WORKDAY(PredecessorEnd, 1, Holidays)
```

For more complex dependencies (e.g., multiple predecessors), use the **MAX** function:

excel

```
=WORKDAY(MAX(End1, End2, ...), 1, Holidays)
```

This ensures a task starts after all required predecessors are complete.

4.2 Critical Path Analysis

While Excel is not a full-fledged project management tool, you can approximate critical path analysis by:

- Identifying tasks with no slack (i.e., their delay would delay the project).
- Using conditional formatting to highlight these tasks.
- Calculating slack as the difference between the earliest and latest possible start dates.

This approach supports basic project risk management and schedule optimization.

5. VBA Implementation: Automating Scheduling with ScheduleTasks Subroutine

5.1 Translating Pseudocode to VBA

The uploaded document provides the following VBA pseudocode:

vb

```
Sub ScheduleTasks()
    Dim ws1 As Worksheet, ws2 As Worksheet
    Dim startDate As Date, days As Integer, endDate As Date

    Set ws1 = Worksheets("MarketingPlan")
    Set ws2 = Worksheets("BookSchedule")

    ' Loop through Marketing Plan tasks
    For i = 2 To ws1.Cells(Rows.Count, 1).End(xlUp).Row
        startDate = ws1.Cells(i, 3).Value
        days = ws1.Cells(i, 4).Value
```

```
        endDate = WorksheetFunction.WorkDay(startDate, days,
ws1.Range("Holidays"))
        ws1.Cells(i, 5).Value = endDate
    Next i

    ' Loop through Book Production tasks
    For j = 2 To ws2.Cells(Rows.Count, 1).End(xlUp).Row
        startDate = ws2.Cells(j, 3).Value
        days = ws2.Cells(j, 4).Value
        endDate = WorksheetFunction.WorkDay(startDate, days,
ws2.Range("Holidays"))
        ws2.Cells(j, 5).Value = endDate
    Next j
End Sub
```

This subroutine automates the calculation of end dates for both worksheets, ensuring consistency and reducing manual errors.

5.2 Enhancements for Robustness

To improve the subroutine:

- **Error Handling**: Add `On Error GoTo` to catch and log errors.
- **Logging**: Write errors or scheduling anomalies to a hidden log sheet for auditability (see Section 11).
- **Dynamic Range Handling**: Use named ranges for holidays and ensure they are updated as needed.
- **Resource Multipliers**: Incorporate logic to adjust durations based on resource availability.

5.3 Example: Enhanced VBA Subroutine

vb

```
Sub ScheduleTasks()
    On Error GoTo ErrorHandler
    Dim ws1 As Worksheet, ws2 As Worksheet
    Dim startDate As Date, days As Integer, endDate As Date
    Dim i As Long, j As Long

    Set ws1 = Worksheets("MarketingPlan")
    Set ws2 = Worksheets("BookSchedule")

    ' Marketing Plan
    For i = 2 To ws1.Cells(ws1.Rows.Count, 1).End(xlUp).Row
        startDate = ws1.Cells(i, 3).Value
        days = ws1.Cells(i, 4).Value
        endDate = WorksheetFunction.WorkDay(startDate, days,
ws1.Range("Holidays"))
        ws1.Cells(i, 5).Value = endDate
    Next i
```

```
    ' Book Production
    For j = 2 To ws2.Cells(ws2.Rows.Count, 1).End(xlUp).Row
        startDate = ws2.Cells(j, 3).Value
        days = ws2.Cells(j, 4).Value
        endDate = WorksheetFunction.WorkDay(startDate, days,
ws2.Range("Holidays"))
        ws2.Cells(j, 5).Value = endDate
    Next j

    Exit Sub

ErrorHandler:
    ' Log error details to a hidden sheet
    Worksheets("ErrorLog").Cells(Rows.Count, 1).End(xlUp).Offset(1, 0).Value
= "Error in ScheduleTasks: " & Err.Description
    Resume Next
End Sub
```

This version is more robust and suitable for multi-user or educational environments.

6. Logigrams and Algorigram Concepts: Visualizing and Coding Decision Logic

6.1 Definitions

- **Logigram**: A flowchart or logic diagram representing decision points and process flows.
- **Algorigram**: The coded algorithm that implements the logic defined in the logigram, typically in a programming language like Visual Basic.

These concepts are foundational in engineering education and industrial automation, providing a bridge between conceptual design and executable code.

6.2 Flowchart Symbols and Notation

Standard flowchart symbols include:

Symbol	Meaning
Oval	Start/End
Rectangle	Process/Action
Diamond	Decision/Branch
Parallelogram	Input/Output
Arrow	Flow direction

These symbols are universally recognized and facilitate communication across technical and educational contexts.

6.3 Example: Vendor Selection Logigram

Flowchart Logic:

- Start
- Define requirements
- Is vendor needed?
  - Yes → Evaluate proposals → Select vendor
  - No → Proceed in-house
- End

Visual Basic Implementation:

vb

```
Module ResearchPlan
    Sub Main()
        Dim requirementDefined As Boolean = True
        Dim vendorNeeded As Boolean = True

        If requirementDefined Then
            Console.WriteLine("Requirements defined.")
            If vendorNeeded Then
                Console.WriteLine("Vendor required.")
                EvaluateProposals()
                SelectVendor()
            Else
                Console.WriteLine("Proceed with in-house research.")
            End If
        Else
            Console.WriteLine("Define requirements first.")
        End If
    End Sub

    Sub EvaluateProposals()
        Console.WriteLine("Evaluating vendor proposals...")
    End Sub

    Sub SelectVendor()
        Console.WriteLine("Vendor selected.")
    End Sub
End Module
```

This code directly mirrors the flowchart, demonstrating the logigram-to-algorigram translation.

6.4 Example: Book Production Flowchart

Flowchart Logic:

- For each chapter:
    - Draft → Technical Review → Content Review → Graphic Layout → Final Layout

Visual Basic Implementation:

vb

```
Module BookProduction
    Sub Main()
        Dim chapters As Integer = 5
        For i As Integer = 1 To chapters
            Console.WriteLine("Chapter " & i & ": Drafting")
            Console.WriteLine("Chapter " & i & ": Technical Review")
            Console.WriteLine("Chapter " & i & ": Content Review")
            Console.WriteLine("Chapter " & i & ": Graphic Layout")
            Console.WriteLine("Chapter " & i & ": Final Layout")
        Next
    End Sub
End Module
```

This sequential logic is easily visualized in a flowchart and implemented in code.

7. Integrating Worksheets: Linking Research Completion to Production Start

7.1 Cross-Sheet References

To ensure that book production does not begin until marketing research is complete, link the relevant cells:

- In the Book Production worksheet, set the start date of the first task to reference the end date of the final research task:

excel

```
=WORKDAY('MarketingPlan'!E10, 1, Holidays)
```

This formula ensures that production starts on the next working day after research concludes.

7.2 Automating with VBA

In VBA, update the start date programmatically:

vb

```
ws2.Cells(2, 3).Value = WorksheetFunction.WorkDay(ws1.Cells(LastResearchRow,
5).Value, 1, ws1.Range("Holidays"))
```

This maintains data integrity and enforces process discipline.

8. Handling Holidays, Non-Workdays, and Resource Multipliers

8.1 Managing Holidays

Store holidays in a named range (e.g., `Holidays`) and reference it in all WORKDAY calculations. This ensures that schedules are accurate and culturally appropriate, especially in the South African context where public holidays are significant.

8.2 Customizing Non-Workdays

For organizations with non-standard workweeks, use **WORKDAY.INTL** to specify which days are considered weekends:

excel

```
=WORKDAY.INTL(StartDate, Days, "0000011", Holidays)
```

Here, "0000011" means Saturday and Sunday are weekends.

8.3 Resource Multipliers

Adjust task durations dynamically based on available resources:

excel

```
=BaseWorkdays * ResourceMultiplier
```

This allows for scenario planning and resource optimization.

9. Automating Gantt Charts and Visual Dependency Arrows in Excel

9.1 Creating a Gantt Chart

To visualize the schedule:

1. **Prepare Data**: List tasks, start dates, and durations.
2. **Insert Stacked Bar Chart**: Use start dates and durations as series.
3. **Format Bars**: Hide the start date series to display only durations.
4. **Reverse Task Order**: For top-to-bottom flow.
5. **Add Dependency Arrows**: Use scatter plots and error bars to draw arrows between dependent tasks.

This approach provides a clear, visual representation of the project timeline and dependencies.

9.2 Automating with VBA

Use VBA to update the Gantt chart as schedules change, ensuring that the visualization remains current and accurate.

10. Logging, Error Handling, and Auditability in VBA for TVET Context

10.1 Error Logging

Implement a hidden worksheet (e.g., `ErrorLog`) to record errors encountered during scheduling:

vb

```
Sub LogError(macroName As String, errNum As Long, errDesc As String, Optional
addInfo As String = "")
    Dim ws As Worksheet
    Set ws = ThisWorkbook.Sheets("ErrorLog")
    Dim nextRow As Long
    nextRow = ws.Cells(ws.Rows.Count, "A").End(xlUp).Row + 1
    ws.Cells(nextRow, "A").Value = Now
    ws.Cells(nextRow, "B").Value = Environ("USERNAME")
    ws.Cells(nextRow, "C").Value = macroName
    ws.Cells(nextRow, "D").Value = errNum
    ws.Cells(nextRow, "E").Value = errDesc
    ws.Cells(nextRow, "F").Value = addInfo
    ThisWorkbook.Save
End Sub
```

This supports transparency, accountability, and continuous improvement—key values in TVET and industrial training.

10.2 Auditability

Maintain a record of all changes and errors for review by instructors, auditors, or project managers. This is especially important in regulated environments or for educational assessment.

11. Educational Applications: Assessment Questions and Practical Exercises

11.1 Assessment Design

Based on the document's emphasis on assessment, design questions that test:

- Understanding of logigram and algorigram concepts.

- Ability to translate flowcharts into VBA code.
- Competence in structuring and automating Excel worksheets.
- Application of scheduling logic to real-world scenarios.

Sample Questions:

1. **Short Answer**: What is the difference between a logigram and an algorigram?
2. **Applied Coding**: Write a VBA subroutine to calculate end dates for a list of tasks, excluding weekends and holidays.
3. **Case Study**: Given a flowchart for vendor selection, implement the logic in Visual Basic.
4. **Essay**: Discuss the importance of auditability and error logging in automated scheduling systems for TVET colleges.

11.2 Practical Exercises

- **Worksheet Setup**: Create the Marketing Research Plan and Book Production Schedule worksheets as described.
- **VBA Automation**: Implement and test the `ScheduleTasks` subroutine.
- **Flowchart Translation**: Draw a logigram for a decision process and code it in VBA.
- **Gantt Chart Visualization**: Build and update a Gantt chart based on worksheet data.

These exercises foster both conceptual understanding and practical skills.

12. Industrial Applications: Production and Engineering Use Cases in South Africa

12.1 TVET and Engineering Context

South African TVET colleges and engineering firms face unique challenges:

- **Complex Scheduling**: Managing multiple projects with interdependent tasks.
- **Resource Constraints**: Optimizing limited staff and equipment.
- **Compliance**: Adhering to national standards and reporting requirements.

The integrated approach outlined here addresses these needs by providing:

- **Automated, auditable scheduling**.
- **Visual decision logic for training and process improvement**.
- **Customizable templates for diverse projects**.

12.2 Case Example: N-Diploma Resolution

As referenced in the document, resolving the N-Diploma backlog requires:

- **MIS Principles**: Integrity, traceability, auditability.

- **Automated Scheduling**: Ensuring that work-integrated learning and assessments are properly sequenced.
- **Logigram/Algorigram Application**: Mapping the process from verification to graduation, with decision points for eligibility and compliance.

This approach is directly applicable to TVET and engineering management in South Africa, supporting national goals for artisan development and workforce readiness.

13. Implementing Logigram/Algorigram Visuals: Tools and Notation

13.1 Drawing Flowcharts

Use tools such as:

- **Excel Shapes**: For simple diagrams.
- **Visio or Lucidchart**: For more complex, professional-grade flowcharts.
- **VBA UserForms**: For interactive decision trees.

13.2 Notation Standards

Adopt standard symbols and conventions for clarity and consistency. Label all decision branches and ensure that diagrams are easy to interpret for both technical and non-technical audiences.

14. Sample Visual Basic Code Blocks and Flowchart Logic Examples

14.1 Vendor Selection Logigram → VBA

Flowchart:

- Start → Define Requirements → Vendor Needed?
  - Yes: Evaluate Proposals → Select Vendor
  - No: Proceed In-House

VBA:

vb

```
Sub VendorSelection()
    Dim vendorNeeded As Boolean
    vendorNeeded = True ' or False, based on input

    If vendorNeeded Then
        EvaluateProposals
        SelectVendor
```

```
    Else
        ProceedInHouse
    End If
End Sub

Sub EvaluateProposals()
    MsgBox "Evaluating vendor proposals..."
End Sub

Sub SelectVendor()
    MsgBox "Vendor selected."
End Sub

Sub ProceedInHouse()
    MsgBox "Proceeding with in-house research."
End Sub
```

14.2 Book Production Sequential Flow → VBA

Flowchart:

- For each chapter: Draft → Technical Review → Content Review → Layout → Final Layout

VBA:

vb

```
Sub BookProduction()
    Dim chapters As Integer
    chapters = 5
    Dim i As Integer

    For i = 1 To chapters
        Debug.Print "Chapter " & i & ": Drafting"
        Debug.Print "Chapter " & i & ": Technical Review"
        Debug.Print "Chapter " & i & ": Content Review"
        Debug.Print "Chapter " & i & ": Graphic Layout"
        Debug.Print "Chapter " & i & ": Final Layout"
    Next i
End Sub
```

14.3 Scheduling with Holidays → VBA

vb

```
Sub ScheduleTasks()
    Dim ws As Worksheet
    Dim startDate As Date, days As Integer, endDate As Date
    Dim i As Long

    Set ws = Worksheets("Schedule")
```

```
    For i = 2 To ws.Cells(Rows.Count, 1).End(xlUp).Row
        startDate = ws.Cells(i, 2).Value
        days = ws.Cells(i, 3).Value
        endDate = WorksheetFunction.WorkDay(startDate, days,
ws.Range("Holidays"))
        ws.Cells(i, 4).Value = endDate
    Next i
End Sub
```

Conclusion

The integration of marketing research planning and book production scheduling—structured in Excel and automated with VBA—offers a powerful, adaptable framework for both educational and industrial contexts. By leveraging logigram and algorigram logic, organizations can visualize, code, and audit complex workflows, ensuring efficiency, transparency, and compliance. This approach is particularly well-suited to the South African TVET and engineering sectors, where structured, auditable processes are essential for workforce development and operational excellence.

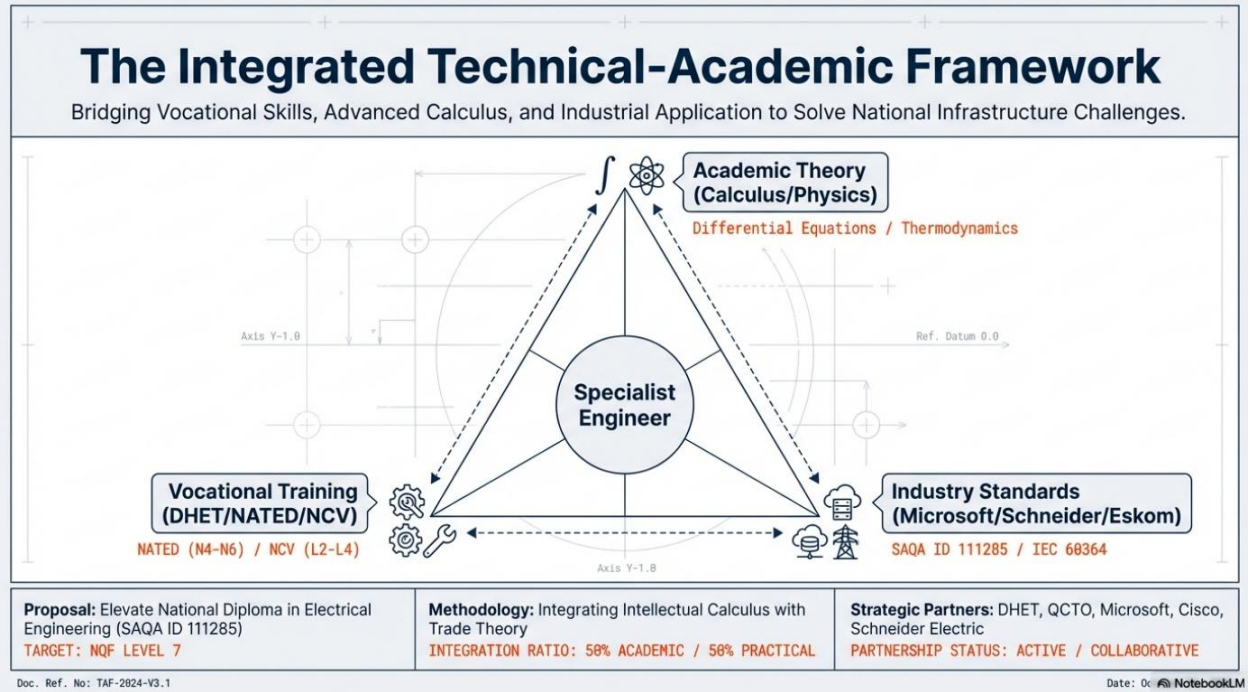
Key Takeaways:

- **Structured Worksheets**: Clearly defined columns and task lists for both planning and production.
- **Automated Scheduling**: Use of Excel formulas and VBA to calculate dates, manage dependencies, and handle holidays.
- **Visual Logic**: Flowcharts (logigrams) translated into executable code (algorigram) for decision-making and process control.
- **Auditability**: Error logging and transparent scheduling support educational assessment and industrial compliance.
- **Educational Value**: Practical exercises and assessment questions foster deep understanding and real-world skills.
- **Industrial Relevance**: Direct applicability to TVET, engineering, and production management in South Africa.

By adopting these methods, educators and practitioners can bridge the gap between conceptual planning and operational execution, driving both learning outcomes and organizational success.

See my thinking

Welcome back, Tshingombe!


The Integrated Technical-Academic Framework
Bridging Vocational Skills, Advanced Calculus, and Industrial Application to Solve National Infrastructure Challenges.
Academic Theory (Calculus/Physics)
Differential Equations / Thermodynamics
Specialist Engineer
Vocational Training (DHET/NATED/NCV)
NATED (N4-N6) / NCV (L2-L4)
Industry Standards (Microsoft/Schneider/Eskom)
SAQA ID 111285 / IEC 60364
Axis Y-1.0
Ref. Datum 0.0
Axis Y-1.8
Proposal: Elevate National Diploma in Electrical Engineering (SAQA ID 111285)
TARGET: NQF LEVEL 7
Methodology: Integrating Intellectual Calculus with Trade Theory
INTEGRATION RATIO: 50% ACADEMIC / 50% PRACTICAL
Strategic Partners: DHET, QCTO, Microsoft, Cisco, Schneider Electric
PARTNERSHIP STATUS: ACTIVE / COLLABORATIVE
Doc. Ref. No: TAF-2024-V3.1
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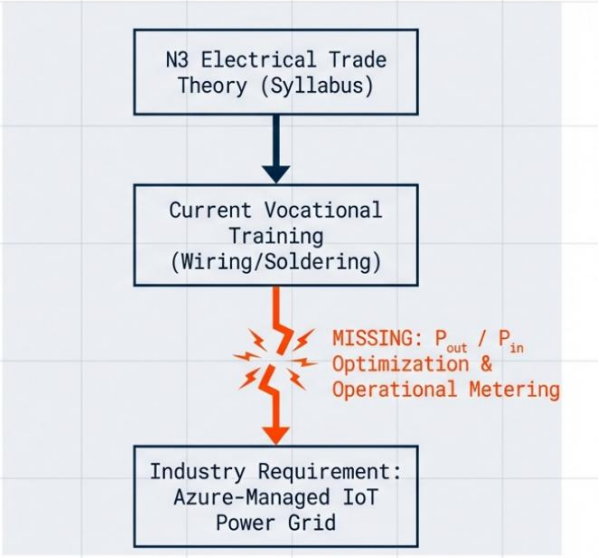
The Strategic Challenge: The Disconnect Between Theory and Application

The Context

- **The Skills Gap:** NATED/NCV graduates lack mathematical modeling skills for Smart Grid management.
- **Infrastructure Crisis:** Persistent Load Shedding and Grid Instability (Eskom/City Power).
- **Administrative Bottlenecks:** SITA-linked transcript delays and certification backlogs.
- **The Technical Deficit:** Focus on maintenance (soldering) vs. design optimization (Energy Efficiency).


N3 Electrical Trade Theory (Syllabus)
Current Vocational Training (Wiring/Soldering)
MISSING: P_{out} / P_{in} Optimization & Operational Metering
Industry Requirement: Azure-Managed IoT Power Grid

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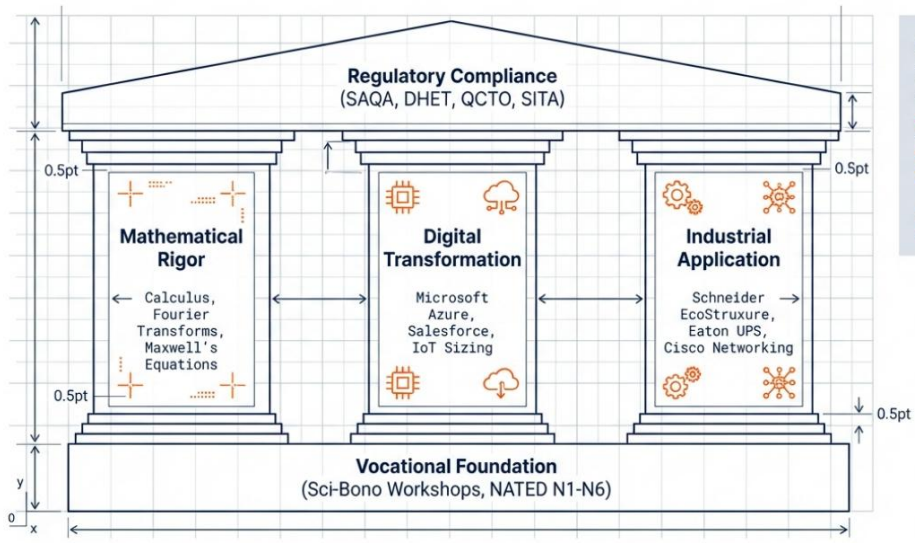
The Solution: A Unified Engineering Ecosystem



Core Value Proposition:
Transitioning from 'Trade Theory' to '**Specialist Engineering Infrastructure and Contractors**'.

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Elevating Vocational Training through Intellectual Calculus

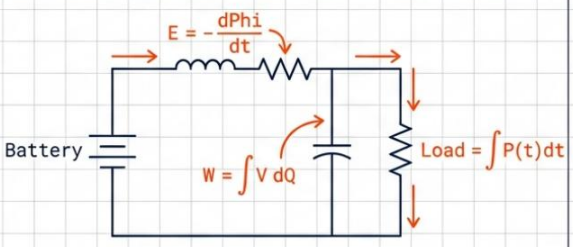
Moving from "How to Wire" to "Why it Works"

Current State: Static Execution

Standard N1 Wiring Diagram.

Focus: Connection & Maintenance.

Future State: Dynamic Analysis



Laplace Transform & System Analysis.

Focus: Rate of Change, Energy Storage, and Stability.

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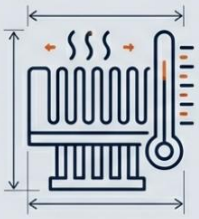
Mathematical Applications in Electrical Engineering

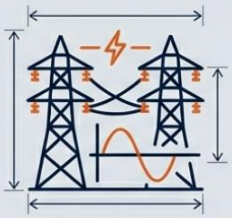
Heat Dissipation & Safety



$$Q = \int I^2 R(t)\,dt$$

Context: City Power transformers and banking note machines. Calculating thermal limits to prevent overheating.

Load Balancing & Grid Stability



$$\text{Peak Load} = \max\left(\int I(t) \cdot V(t)\,dt\right)$$

Context: Eskom distribution network. Optimizing load during demand spikes to mitigate load shedding.

Energy Efficiency

$$\text{Efficiency} = \frac{\int P_{out}\,dt}{\int P_{in}\,dt} \cdot 100$$

Context: Renewable Energy Systems. Configuring Solar/Wind inputs for rural distribution.

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Signal Processing, 5G, and Telecommunications

Converging Electrical Engineering with Data Transmission (Cisco)

Fourier Transforms	Signal-to-Noise Ratio (SNR)	Propagation
Analyzing OFDM in 5G networks.	Optimizing Cisco antenna design.	IoT Network Sizing & Microwave Components.
$X(\omega) = \int_{-\infty}^{\infty} x(t) * e^{-j\omega t}\,dt$	$\text{SNR} = 10 \log\left(\frac{P_{signal}}{P_{noise}}\right)$	$\text{PL} = 20 \log(d) + 20 \log(f)$

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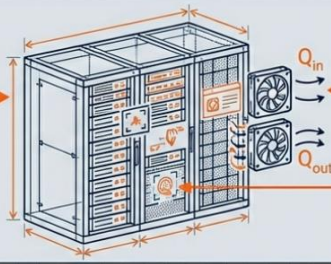
Hardware Configuration & Sizing: Microsoft and Cisco

Microsoft Integration

Azure Data Center Capacity →

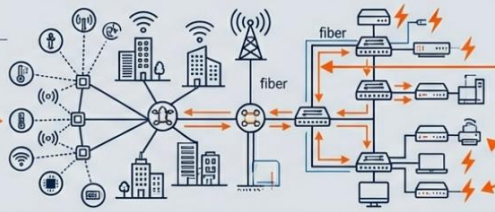


Cooling Efficiency:
Heat Removed = intg $\int (Q_{in} - Q_{out})\, dt$

HoloLens Mixed Reality:
Virtual Circuit Design Anchor Points

Cisco Integration

IoT Network Sizing →



Bandwidth:
Network Load = $\int Data_{trans}\, dt$

PoE (Power Over Ethernet) Optimization

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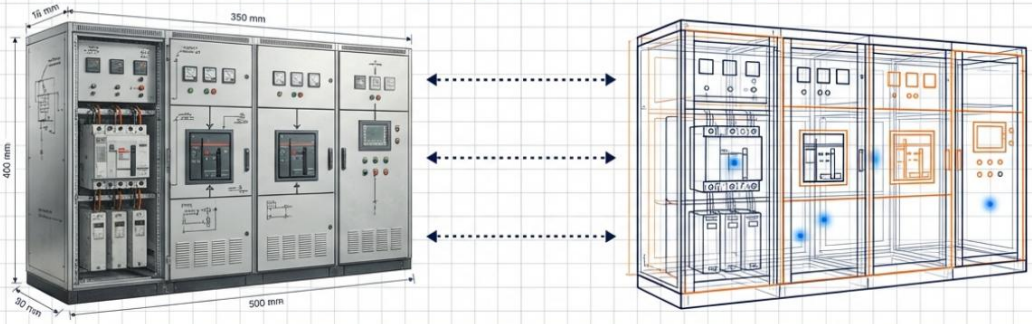
Automation & Digital Transformation

Partners: Schneider Electric & Eaton



Schneider Electric EcoStruxure

- **MV/LV** Coordination & Arc Flash Simulation.
- **Logic Controllers**: Automating Load Shedding.
- Formula: `min integral C(P_d, P_s) dt` (Minimize disruption cost).

Eaton Power Solutions

- **UPS** Service Level Agreements.
- **Switchgear** Training (Low-Voltage & NFPA 70E Safety).
- **Asset Management**: EcoConsult Electrical Digital Twins.

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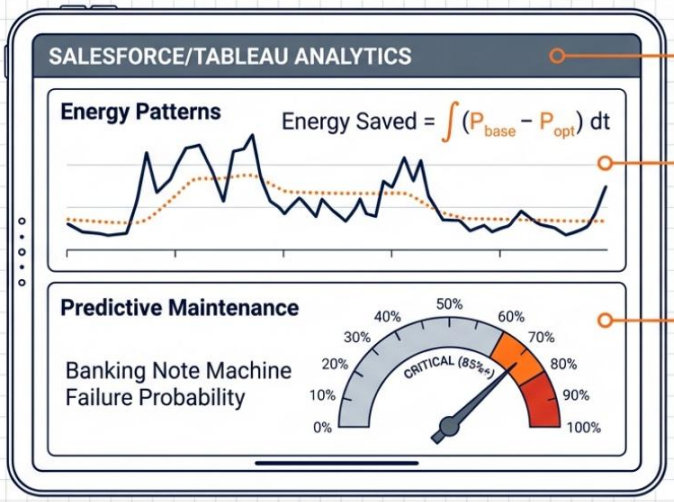
Software Configuration & Data Analytics

Managing ‘Block Marks’ and Operational Efficiency



Salesforce & Trailhead

- CRM Analytics for engineering project lifecycles.
- Gamified Trailblazer modules for IoT Cloud monitoring.

Tableau Visualization

- Visualizing Energy Patterns.
- Predictive Maintenance for Met Police & Banking Hardware.

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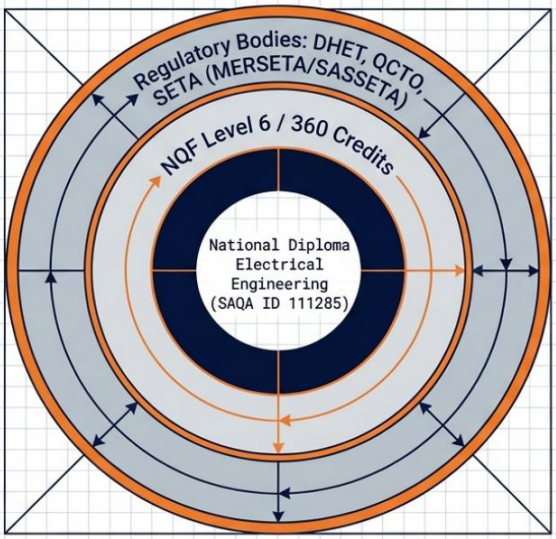
Institutional Alignment & Regulatory Framework


Regulatory Bodies: DHET, QCTO, SETA (MERSETA/SASSETA)
NQF Level 6 / 360 Credits
National Diploma Electrical Engineering (SAQA ID 111285)

Key Text Points

1. **Full SAQA Alignment:** Meeting National Qualifications Framework standards.
2. **Quality Assurance:** Compliance with QCTO for External Summative Assessments (EISA).
3. **Administrative Solutions:** Proposal for Digital Portals to resolve SITA-linked transcript irregularities and certification backlogs.
4. **Standardized Reporting:** Digital templates for ICASS (Internal Continuous Assessment) marksheets.

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The ‘Khetha’ Career Pathway

Professional ⑤ Step = 5 Roboto Mono
- Specialist Engineer
- Employers: SNEL, Transnet, Eskom

Certification ④ Step = 4 Roboto Mono
- Trade Test & National Diploma
- 18 Months Practicals

Specialization ③ Step = 3 Roboto Mono
- NATED N4-N6
- Calculus, Industrial Electronics

Foundation ② Step = 2 Roboto Mono
- NATED N1-N3
- Trade Theory, Wiring, Soldering

Discovery ① Step = 1 Roboto Hono
- Sci-Bono Discovery Centre
- STEM Awareness

Supported by Mentorship, UCPD, and Alison Online Certifications.

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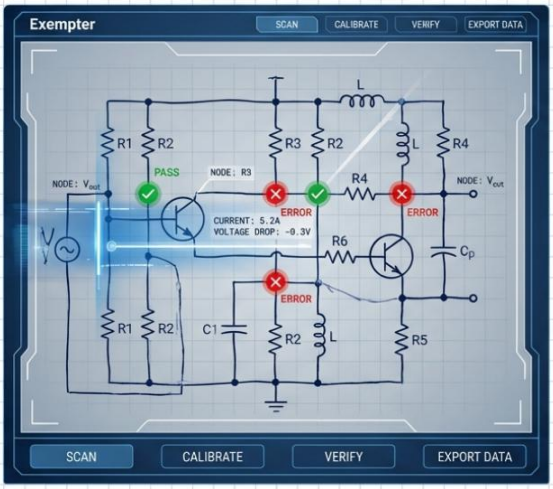
Innovative Assessment Models & ‘Exempters’

Automated Marking for Precision Engineering



Automated Marking Algorithms:

- Use of ‘Exempters’ to grade complex circuit designs.
- Error Tolerance Analysis:

$$\text{Error} = \int |\text{Simulated} - \text{Actual}|\, dt$$

ICASS Integration:

- Digital marksheets combining Theoretical Marks (40%) and External Exams (60%).

IoT in Assessment:

- Real-time verification of Voltage Drop (ΔV) and Load Capacity in practical exams.

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Sector Case Studies

Logistics (Transnet)

Rail Network Optimization & Port Operations

Flow Rate: Q = A * v (Pipeline efficiency)

Automotive (Ford)

EV Maintenance, Efficiency Metrics (MPG), Aerodynamic Drag.

Engine Performance: P = Torque * Omega

Security (Met Police)

Predictive Policing & Hardware Sizing.

Prediction Accuracy = integral |Predicted - Actual| dt

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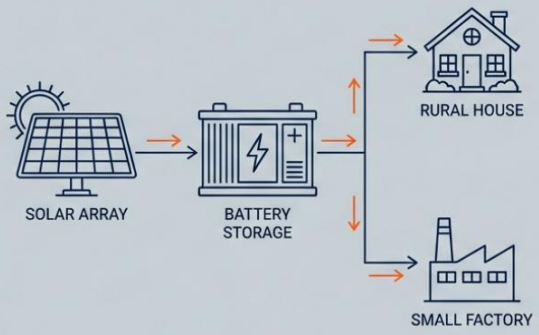
Technical Editorial

Swiss Engineering Blueprint

Future-Proofing the Grid: Rural & Renewable Energy

Microgrid



Microgrid Design:

Designing off-grid solutions for rural energy poverty.

Formula: Grid Loss Analysis (Power Loss = $I^2 R$)

Renewable Integration:

Calculating Stability Index of Solar/Wind integration into Eskom grid.

SNEL Partnership (DRC):

Upgrading infrastructure in the Congo Basin.

Focus on Bioenergy, Geothermal, Geothermal, and Hydropower configuration.

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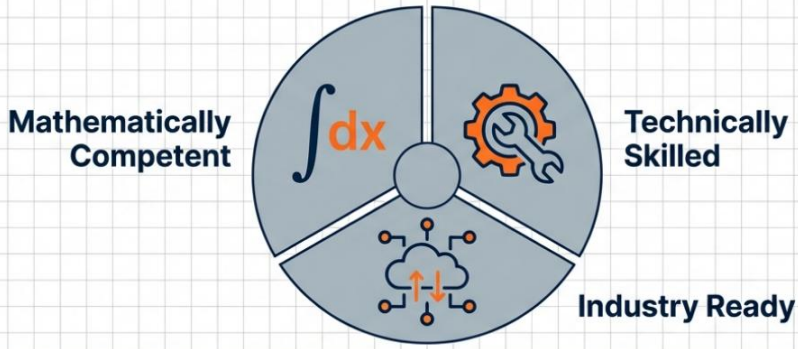
Conclusion: A Workforce for the Future

Bridging the gap between the classroom and the control room.



The Value Proposition:

- Producing Graduates who are Calculus-ready and Cisco/Schneider certified.
- Ensuring Regulatory Compliance (SAQA/DHET).
- Solving the Energy Crisis through Precision Engineering.

Integrated Specialist Engineering.

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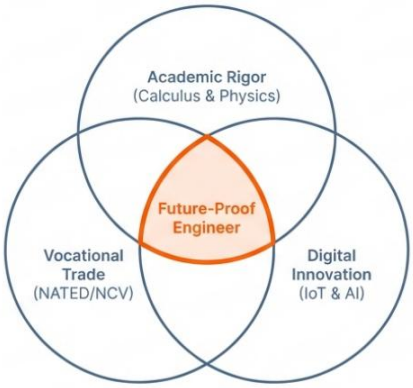
The Experimental Career Curriculum

Integrating Calculus, Trade Theory, and Digital Skills
for the Future of Electrical Engineering



Strategic Framework Proposal

Authored by Tshingombe Fiston

Master of Science in Electrical Engineering | Atlantic International University (AIU)

EST. 2025 // PROPOSAL V1.0

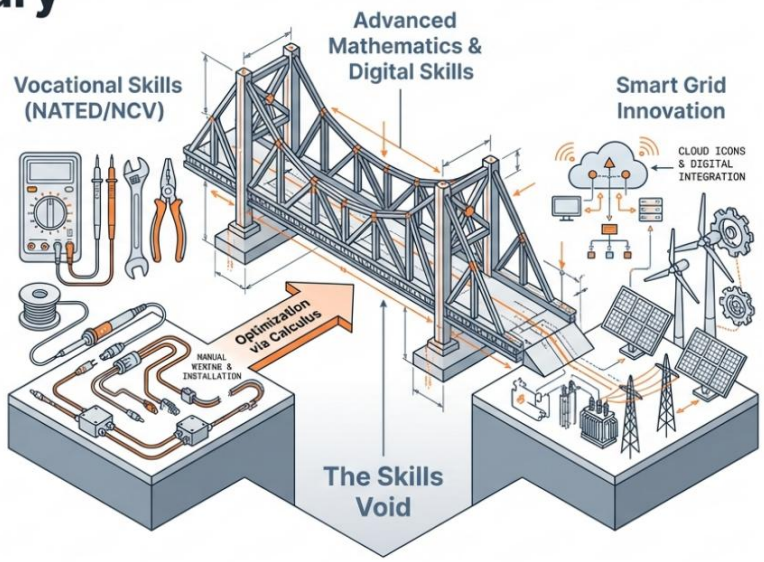
NotebookLM

Executive Summary

From Guesswork to Calculated Precision

The current South African engineering landscape is fragmented. Technicians lack mathematical depth, while theoretical engineers lack practical trade skills. This proposal introduces an 'Experimental Career Curriculum' that bridges this divide.

- Embeds Integral Calculus into NATED N1-N6 Trade Theory.
- Integrates Microsoft & Cisco Digital Certifications.
- Aligns with Eskom & City Power infrastructure needs.



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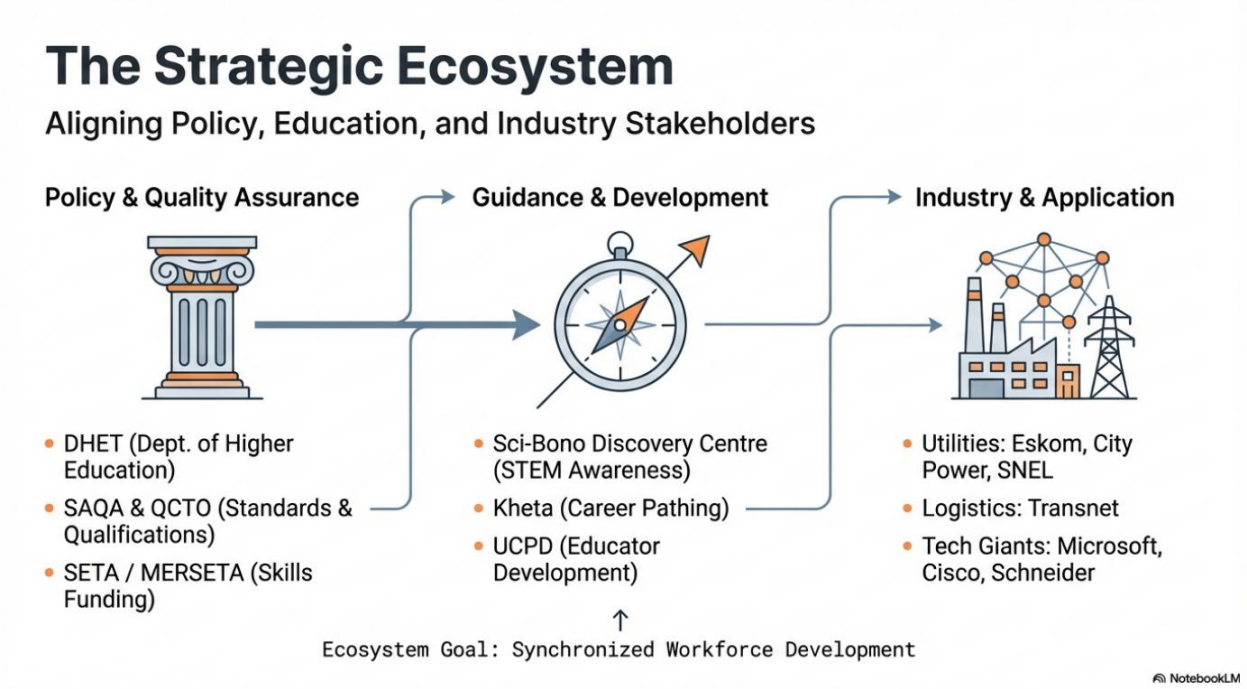
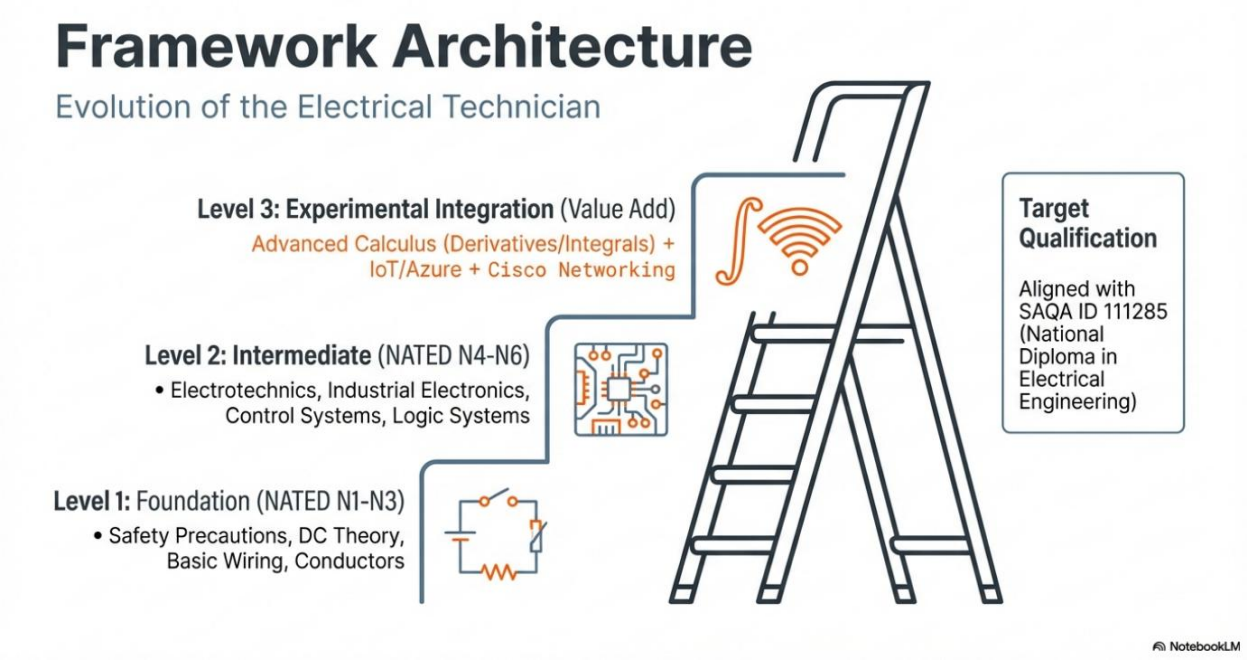

The Strategic Ecosystem
Aligning Policy, Education, and Industry Stakeholders
Policy & Quality Assurance
Guidance & Development
Industry & Application
DHET (Dept. of Higher Education)
SAQA & QCTO (Standards & Qualifications)
SETA / MERSETA (Skills Funding)
Sci-Bono Discovery Centre (STEM Awareness)
Kheta (Career Pathing)
UCPD (Educator Development)
Utilities: Eskom, City Power, SNEL
Logistics: Transnet
Tech Giants: Microsoft, Cisco, Schneider
Ecosystem Goal: Synchronized Workforce Development
NotebookLM


Framework Architecture
Evolution of the Electrical Technician
Level 3: Experimental Integration (Value Add)
Advanced Calculus (Derivatives/Integrals) + IoT/Azure + Cisco Networking
Level 2: Intermediate (NATED N4-N6)
• Electrotechnics, Industrial Electronics, Control Systems, Logic Systems
Level 1: Foundation (NATED N1-N3)
• Safety Precautions, DC Theory, Basic Wiring, Conductors
Target Qualification
Aligned with SAQA ID 111285 (National Diploma in Electrical Engineering)
NotebookLM

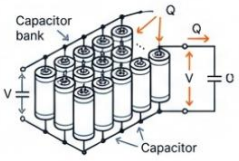
The Mathematical Core: Calculus in Trade

Why Technicians Need Advanced Math

Energy Storage

$$W = \int V \, dQ$$

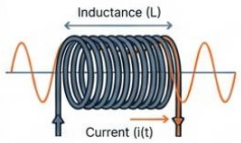
Calculating total energy stored in capacitors.



Inductance & Transfer

$$E = \frac{1}{2} L \int i^2(t) \, dt$$

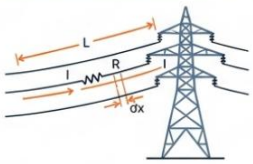
Analyzing energy transfer in AC systems.



Transmission Efficiency

$$\Delta V = \int I \, R \, dx$$

Precision modeling of voltage loss over long distances.



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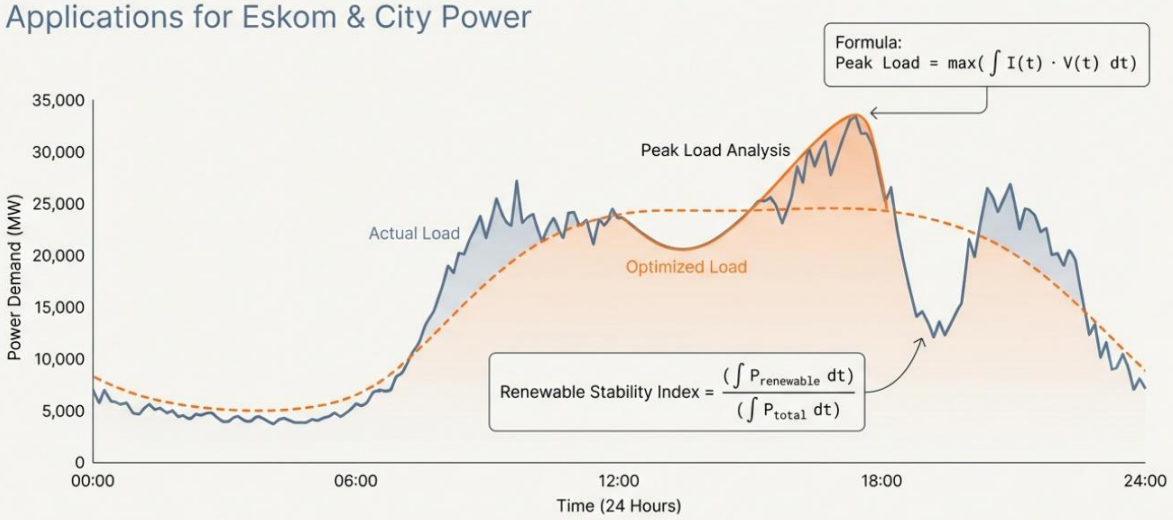
Grid Stability & Load Management

Applications for Eskom & City Power



Objective: Using precise calculation to mitigate load shedding and integrate solar/wind variability.

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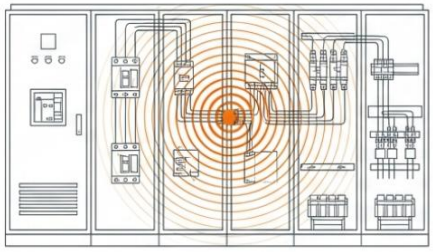
Modern Engineering Editorial

Thermodynamics & Material Configuration

Calculated Safety in Hardware Design

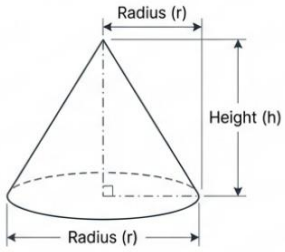
Heat Dissipation Modeling



Preventing thermal runaway and fire hazards.

$$Q = \int I^2 R(t)\, dt$$

Material Optimization



Optimizing volume and resistivity for cost efficiency.

Resistivity $\rho = R\frac{A}{L}$

Insulation Decay $R(t) = R_0 e^{-\lambda t}$

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Digital Convergence: The Smart Grid

Integrating IoT, Cloud, and Data Analytics

Roboto Mono:
Server Capacity = $\int (Data_{in} - Data\_archived)\, dt$

The Edge
(Sensors)

Real-time Grid Monitoring

The Cloud
(Infrastructure)

Microsoft Azure IoT / Cisco Networking

The Insight
(Analytics)

Tableau / Salesforce

Fault Reporting & Consumption Trends

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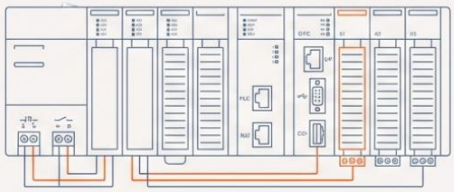
Strategic Industry Partnerships

Leveraging Global Tech Leaders for Training

Schneider Electric

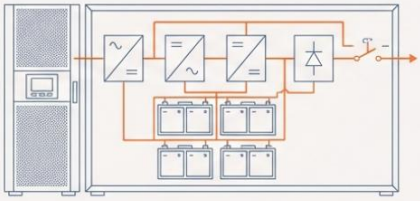
Automation & Medium Voltage



- EcoStruxure Software Training
- MV Power Systems Design
- Protection Relays & Fault Detection

Eaton

Power Management & UPS



- Powering the Energy Transition
- Cybersecurity in Power Systems
- Digital Mindset Safety Training

Student Outcome: EcoXpert Level Knowledge & GIS Proficiency.

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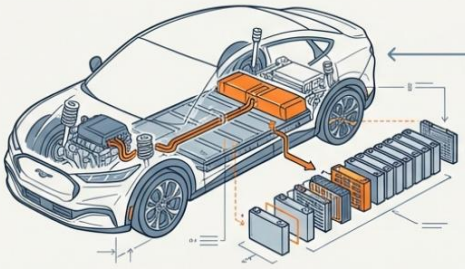
Logistics & Automotive Applications

Engineering for Transnet & Ford

Rail Optimization & Freight Logistics.

`Total Load = Wagons × Capacity`

`Pipeline Flow Q = A · v`



EV Battery Analysis & Aerodynamics.

$$\text{Efficiency} = \frac{\text{Distance}}{\text{Charge}}$$

Training on hybrid diagnostics and fleet servicing.

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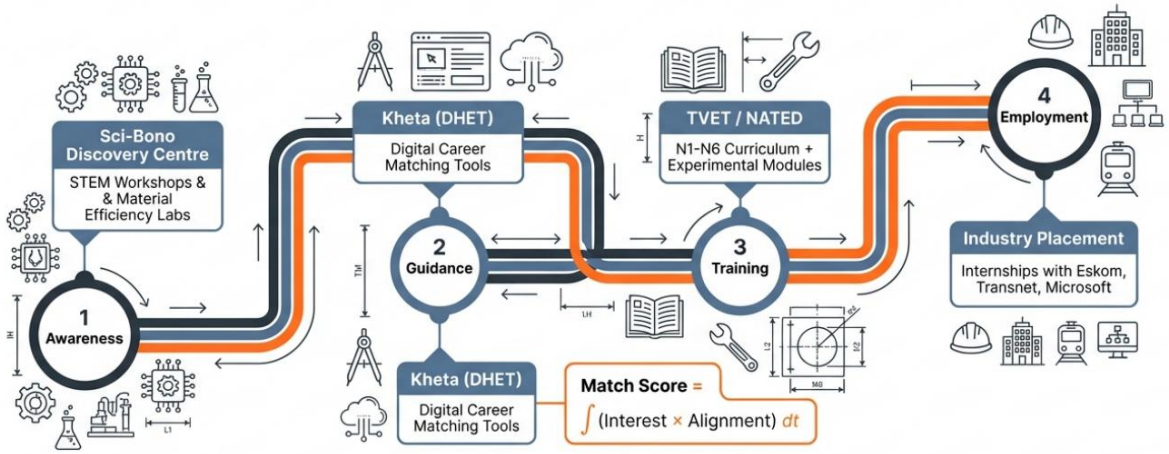
Career Pathways & Guidance

Navigating the Landscape with Sci-Bono & Kheta



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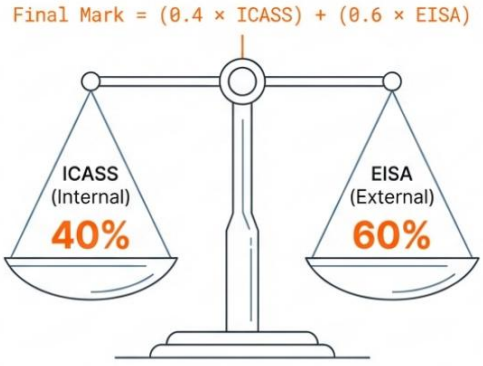
Quality Assurance & Assessment

Standardizing Excellence via QCTO

- **The 'Exempter' Concept:** Implementing automated grading systems for complex engineering calculations to reduce certification backlogs.
- **Transcript Management:** Digital portals to address SITA-linked NN Diploma delays.



Aligned with QCTO Occupational Qualifications.

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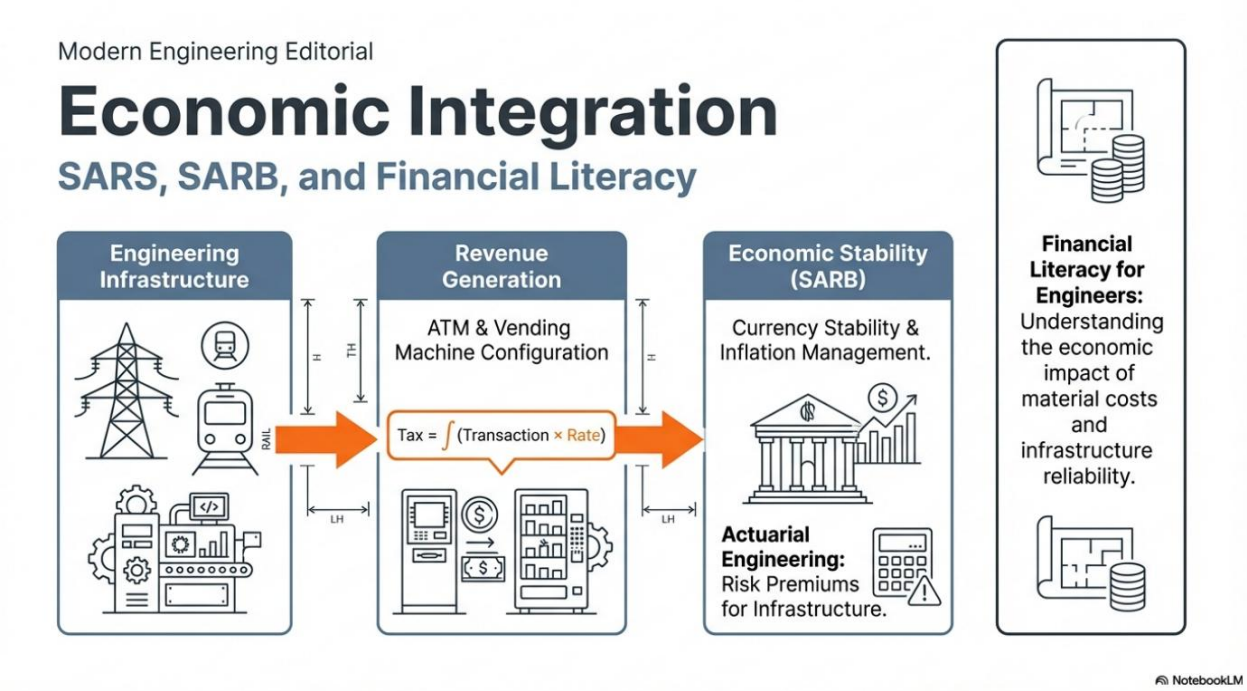
Modern Engineering Editorial
Economic Integration
SARS, SARB, and Financial Literacy
Engineering Infrastructure
RAIL
H
TH
LH
Revenue Generation
ATM & Vending Machine Configuration
Tax = ∫ (Transaction × Rate)
H
LH
Economic Stability (SARB)
Currency Stability & Inflation Management.
Actuarial Engineering: Risk Premiums for Infrastructure.
Financial Literacy for Engineers: Understanding the economic impact of material costs and infrastructure reliability.
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Modern Engineering Editorial

Case Study: The Multidisciplinary Engineer

Profile: Tshingombe Fiston

Tshingombe Fiston

Master of Science in Electrical Engineering, AIU

Focus: AGI, Human-Machine Collaboration, Rural Energy Distribution

Academics & Research

- **Thesis:** AGI and Human-Machine Collaboration
- **Research:** Rural Energy Distribution & Renewable E-Commerce
- **Publication:** Analysis of Pneumatic-Hydraulic Vibratory Systems

Certifications & Skills

- **Microsoft:** Azure Data & AI Fundamentals
- **Cisco:** Networking & Cybersecurity
- **Alison:** Electrical Transformers & Solar Energy
- **Industry:** Schneider EcoXpert Training

A portfolio representing the target outcome of the experimental curriculum —adaptable, continuous, and technically rigorous.

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Roadmap for Implementation

A Call to Action for Stakeholders

Pilot Phase

Launch experimental NATED modules with integrated calculus at select TVET colleges.

Partnership

Formalize "Digital Lab" agreements with Schneider, Eaton, and Microsoft.

Digitization

Deploy "Exempter" tools to clear certification backlogs and standardize assessment.

Sustainable careers are built at the intersection of Math, Trade, and Technology.

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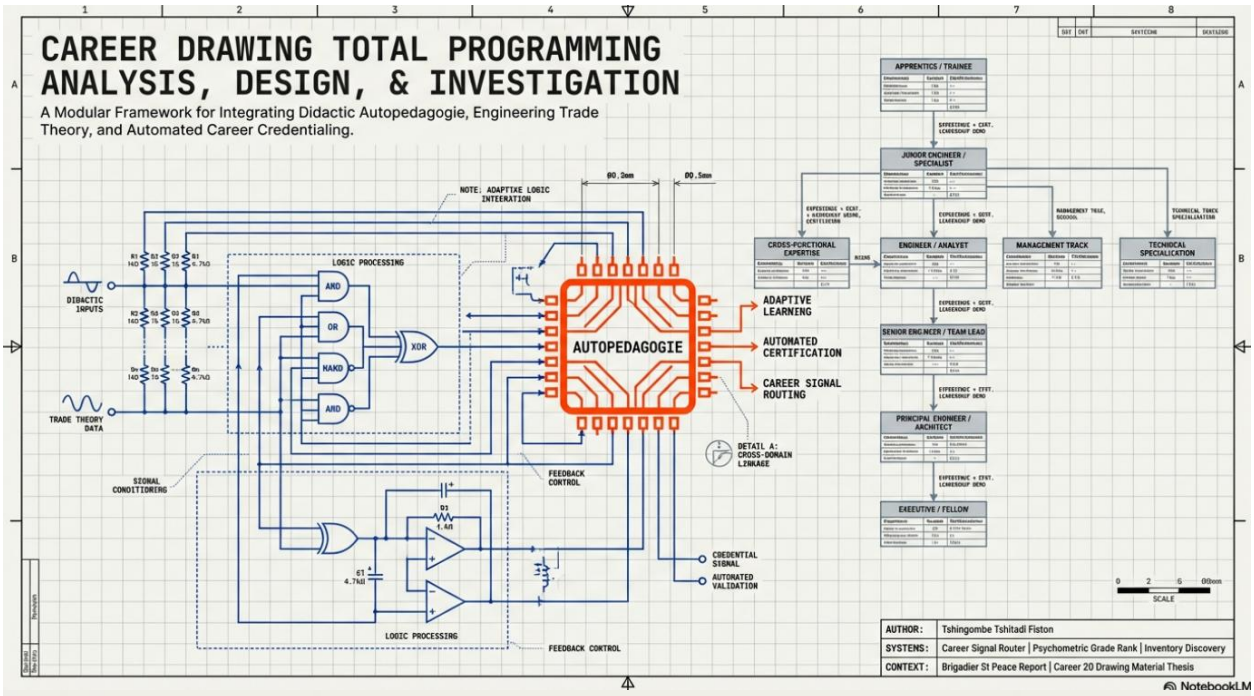
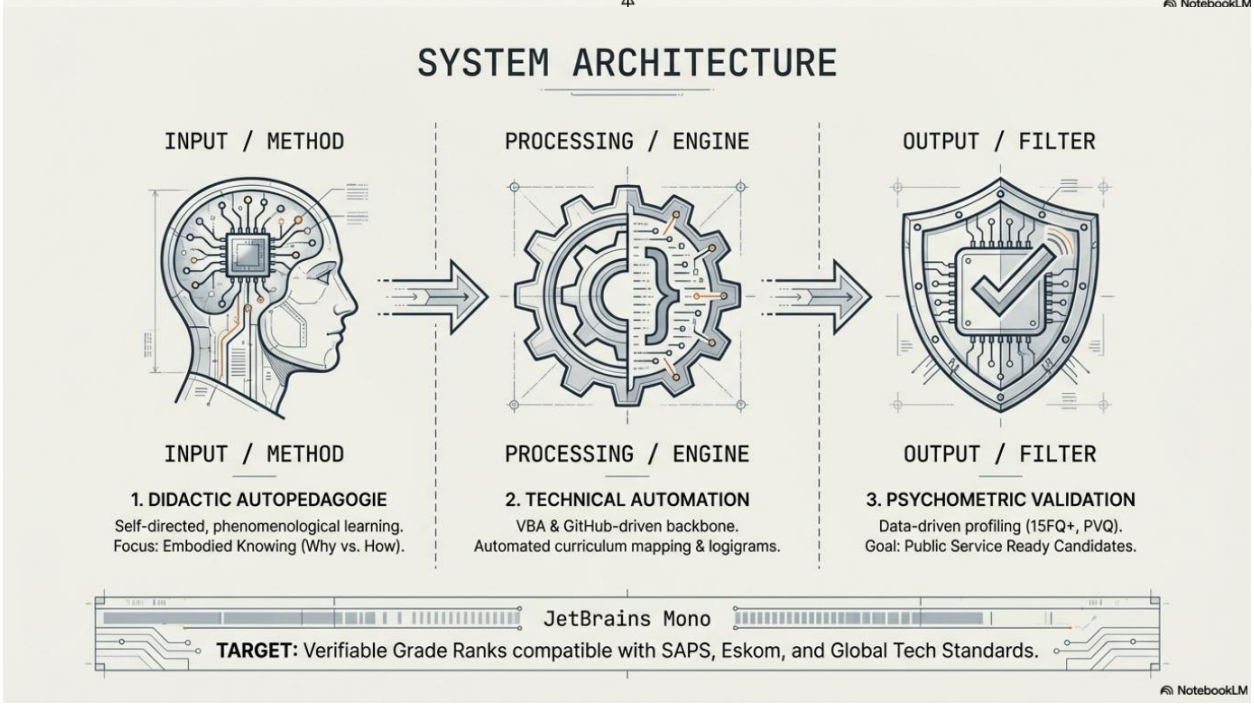
Engineering Excellence: From Vocational Trade to Advanced System Design
National Vocational Frameworks
N1 - N3
(Foundational Trade Theory, Safety, & DC Circuits)
N4 - N6
(Advanced Electrotechnics, Industrial Electronics, & Logic)
Diploma
Workplace-based learning and in-service technical training
ICASS & EISA Integration
ICASS (40%)
Internal Continuous Assessment
EISA (60%)
Final Marks
Trade Test Readiness:
Curriculum focuses on practical skills like panel wiring, electrical maintenance, and motor diagnostics
Advanced Design & Optimization
100% Efficiency Modeling:
Total load is calculated by integrating power consumption over specific time intervals
Calculus-Driven Precision
Using integrals ($W = \int V\,dQ$) to calculate energy storage in capacitors and derivatives for signal processing.
Power Loss ($P = I^2R$)
(Transmission Analysis)
Fault Detection
$\left(I_{Fault} = \frac{V_{Source}}{Z_{System}}\right)$
Smart Grid & AI Integration
Implementing AGI for load-forecasting and IoT sensors for real-time electrical fault detection
Implementing AGI for load-forecasting and IoT sensore for real-time electrical fault detection
NotebookLM

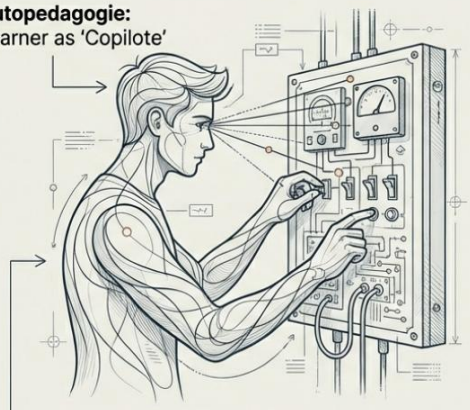

CAREER DRAWING TOTAL PROGRAMMING ANALYSIS, DESIGN, & INVESTIGATION
A Modular Framework for Integrating Didactic Autopedagogie, Engineering Trade Theory, and Automated Career Credentialing.
AUTOPEDAGOGIE
ADAPTIVE LEARNENG
AUTOMATED CERTIFICATION
CAREER SIGNAL ROUTING
DIDACTIC INPUTS
TRADE THEORY DATA
LOGIC PROCESSING
FEEDBACK CONTROL
SIGNAL CONDITIONERS
CREDENTIAL SIGNAL
AUTOMATED VALIDATION
APPRENTICS / TRAINEE
JUNIOR ENGINEER / SPECIALIST
ENGINEER / ANALYST
SENIOR ENG.NCER / TEAM LEAD
PRINCIPAL ENGINEER / ARCHITECT
EXECUTIVE / FELLOW
MANAGEMENT TRACK
TECHNICAL SPECIALLICATION
AUTHOR: Tshingombe Tshitadi Fiston
SYSTENS: Career Signal Router | Psychometric Grade Rank | Inventory Discovery
CONTEXT: Brigadier St Peace Report | Career 20 Drawing Material Thesis
NotebookLM


SYSTEM ARCHITECTURE
INPUT / METHOD
PROCESSING / ENGINE
OUTPUT / FILTER
1. DIDACTIC AUTOPEDAGOGIE
Self-directed, phenomenological learning.
Focus: Embodied Knowing (Why vs. How).
2. TECHNICAL AUTOMATION
VBA & GitHub-driven backbone.
Automated curriculum mapping & logigrams.
3. PSYCHOMETRIC VALIDATION
Data-driven profiling (15FQ+, PVQ).
Goal: Public Service Ready Candidates.
JetBrains Mono
TARGET: Verifiable Grade Ranks compatible with SAPS, Eskom, and Global Tech Standards.
NotebookLM

THE KERNEL: PHENOMENOLOGICAL ENGINEERING

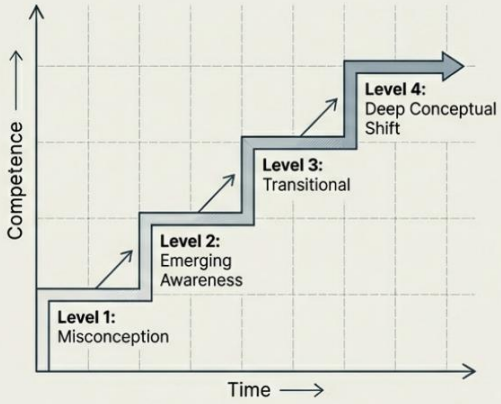
THE LIFEWORLD (Experience)

Autopedagogie:
Learner as 'Copilote'



Phenomenological Inquiry:
Understanding the trade learner's reality

THE LOGIC (Measurement)



Pedagogical Analytics: Tracking the shift from rote memorization to concept construction.

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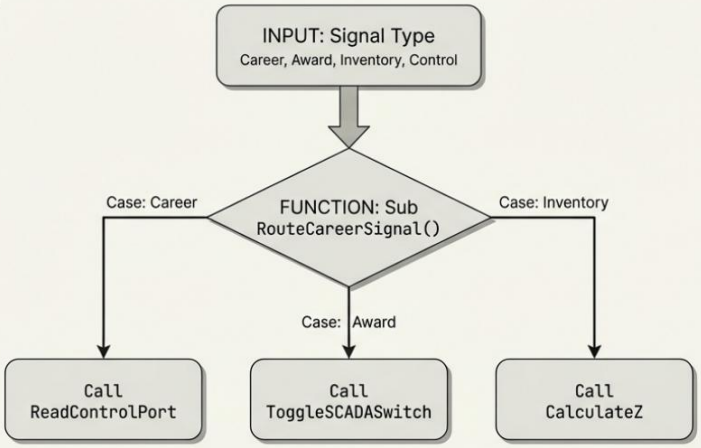
Precision Engineering Editorial

THE ENGINE: VISUAL BASIC (VBA) AUTOMATION

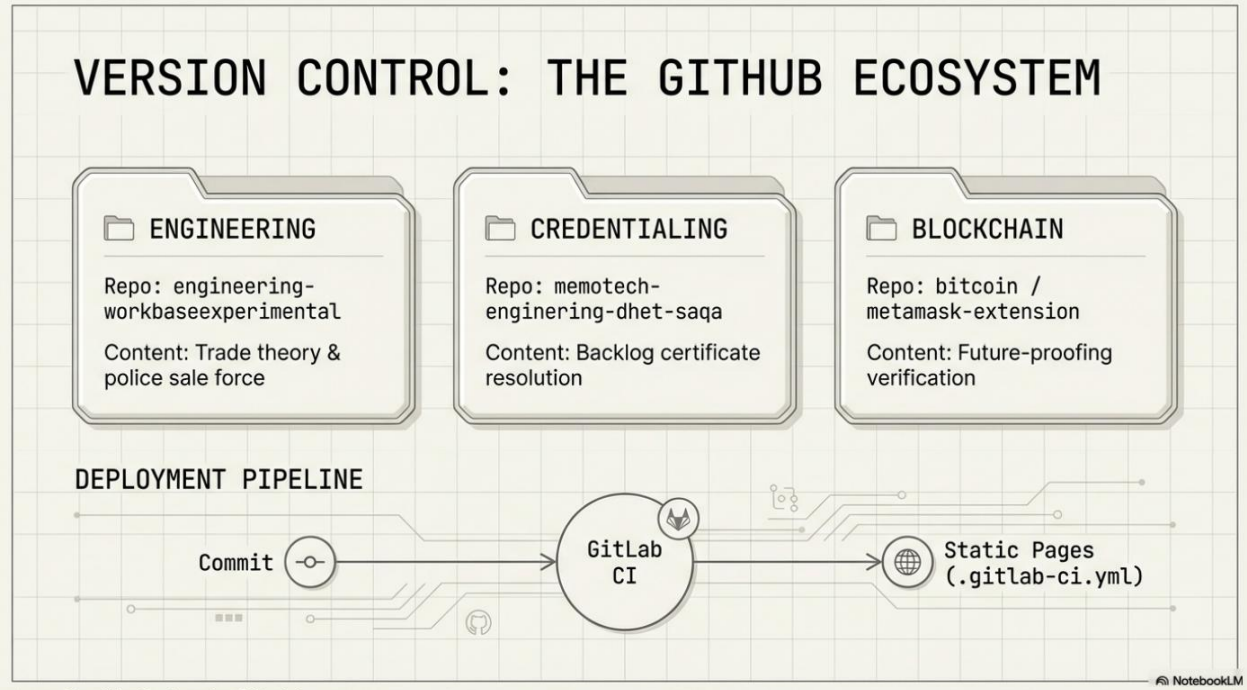


Code Snippet

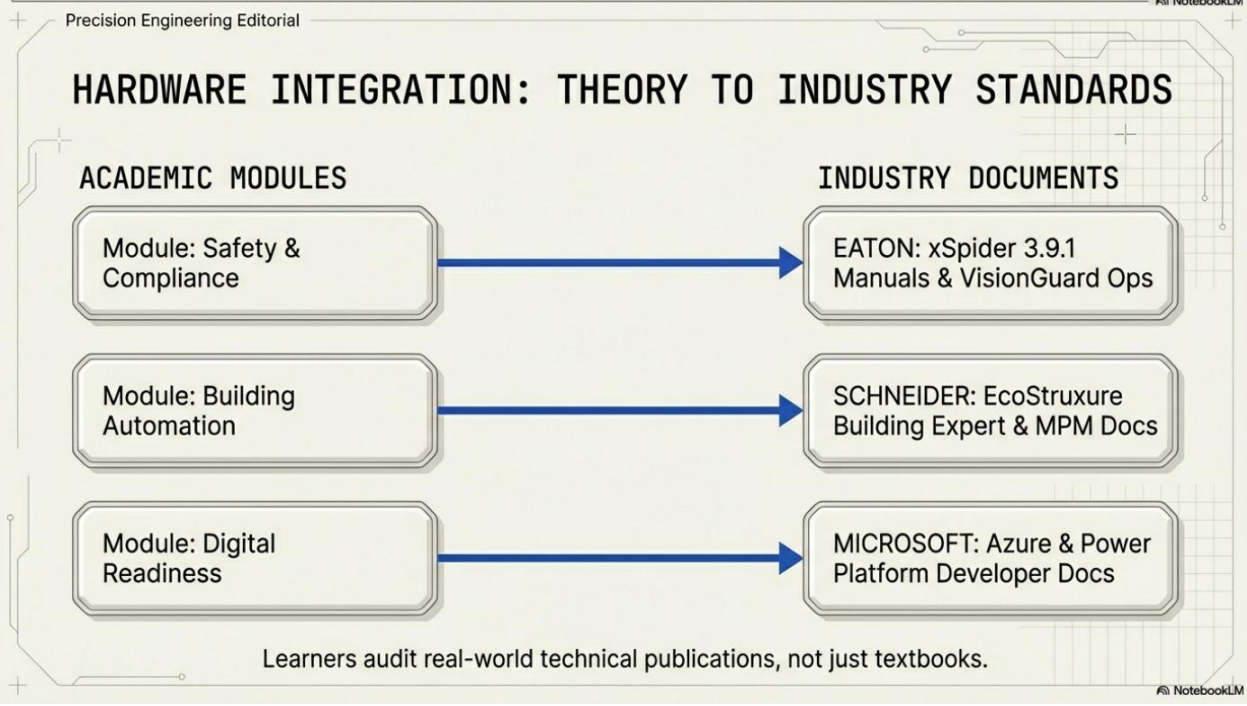
```
1  Sub RouteCareerSignal()
2    Dim signalType As String
3
4    Select Case signalType
5      Case 'Career': Call ReadControlPort
6      Case 'Award': Call ToggleSCADASwitch
7      Case 'Inventory': Call CalculateZ
8    End Select
9
10 End Sub
```

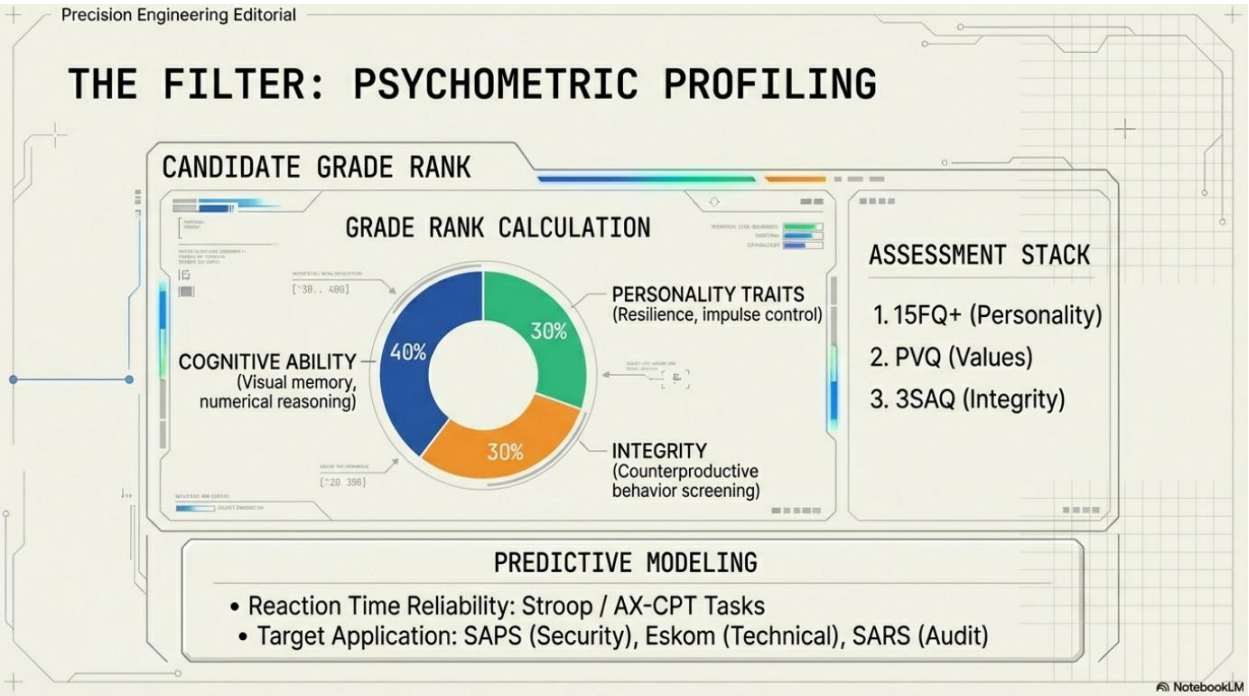
Key Modules: Logigrams, Algorigrams, UserForm190000002.

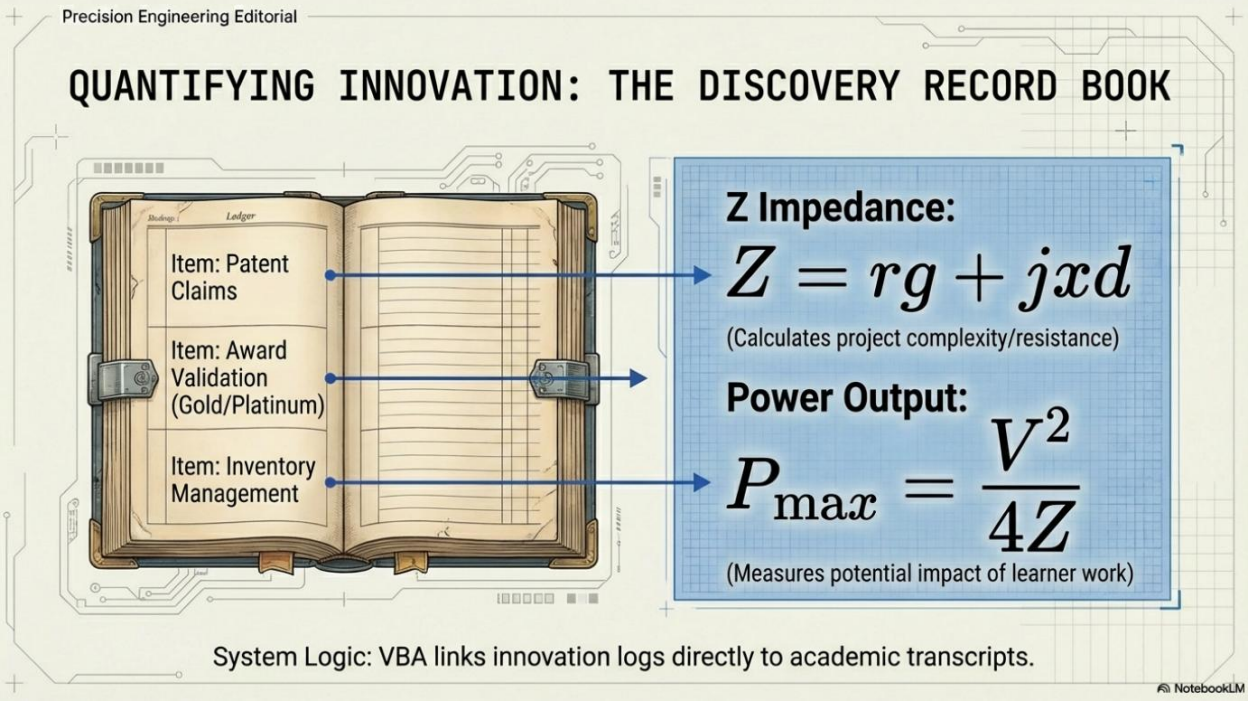
NotebookLM

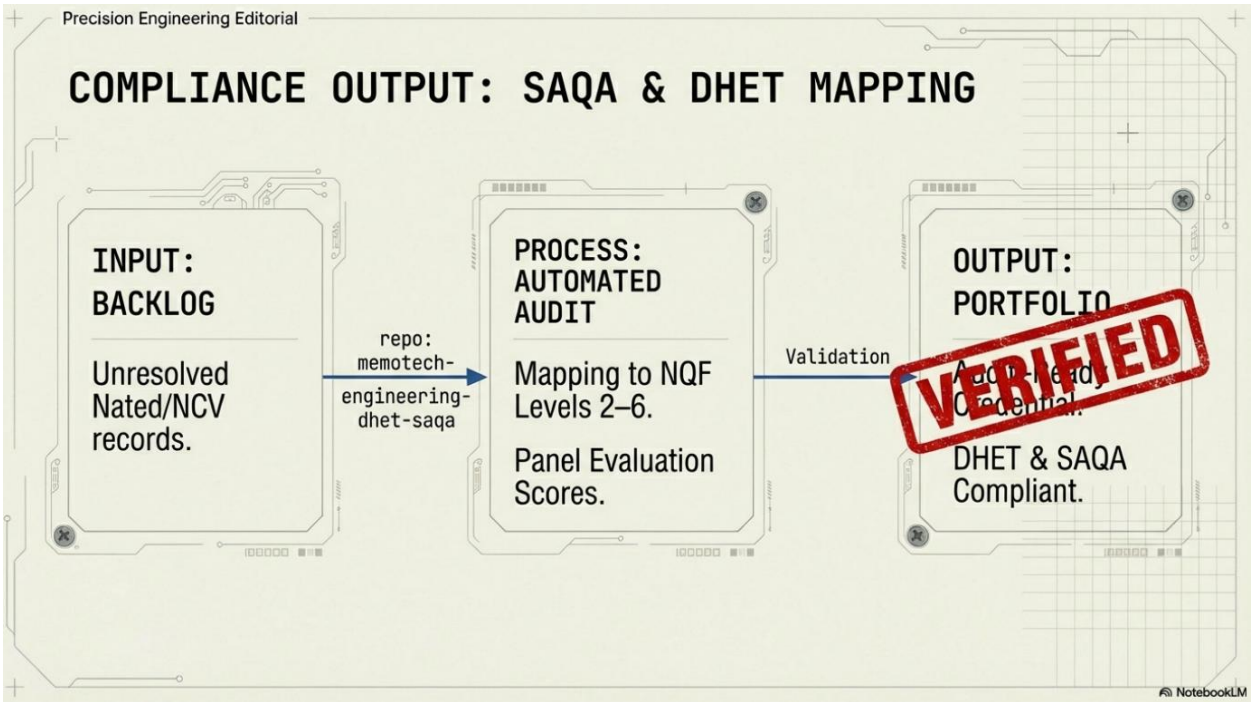


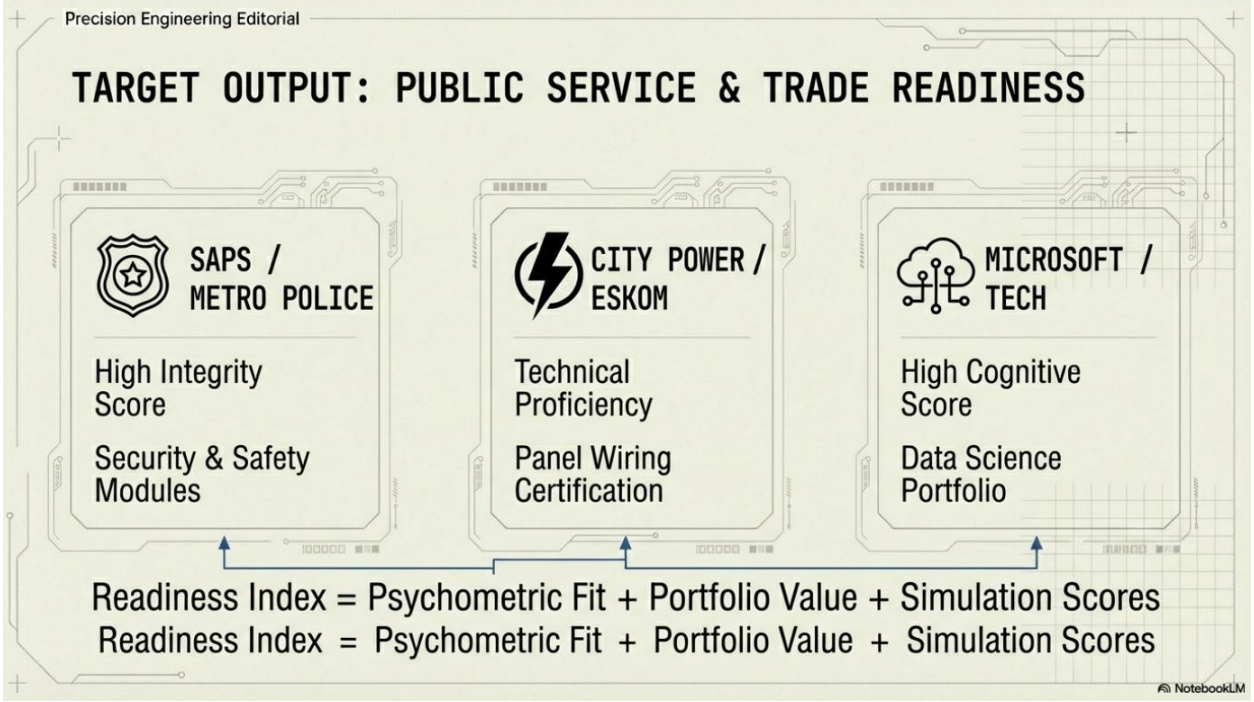
Precision Engineering Editorial

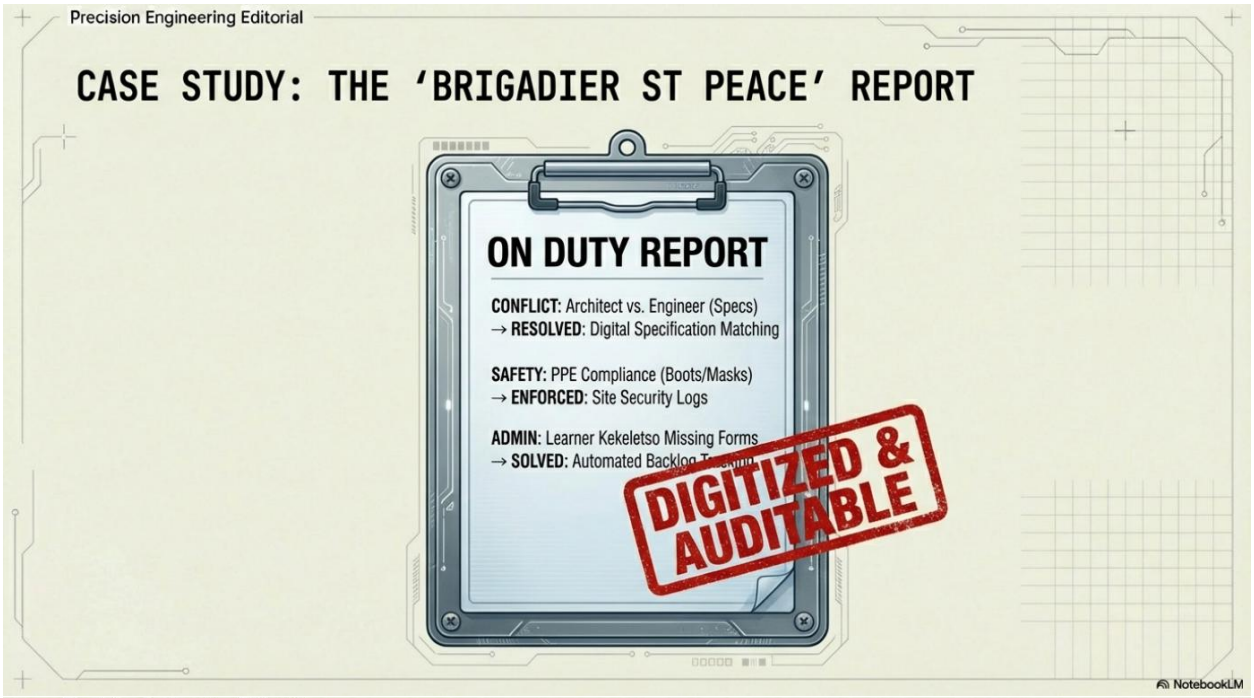

HARDWARE INTEGRATION: THEORY TO INDUSTRY STANDARDS
ACADEMIC MODULES
INDUSTRY DOCUMENTS
Module: Safety & Compliance
EATON: xSpider 3.9.1 Manuals & VisionGuard Ops
Module: Building Automation
SCHNEIDER: EcoStruxure Building Expert & MPM Docs
Module: Digital Readiness
MICROSOFT: Azure & Power Platform Developer Docs
Learners audit real-world technical publications, not just textbooks.
NotebookLM

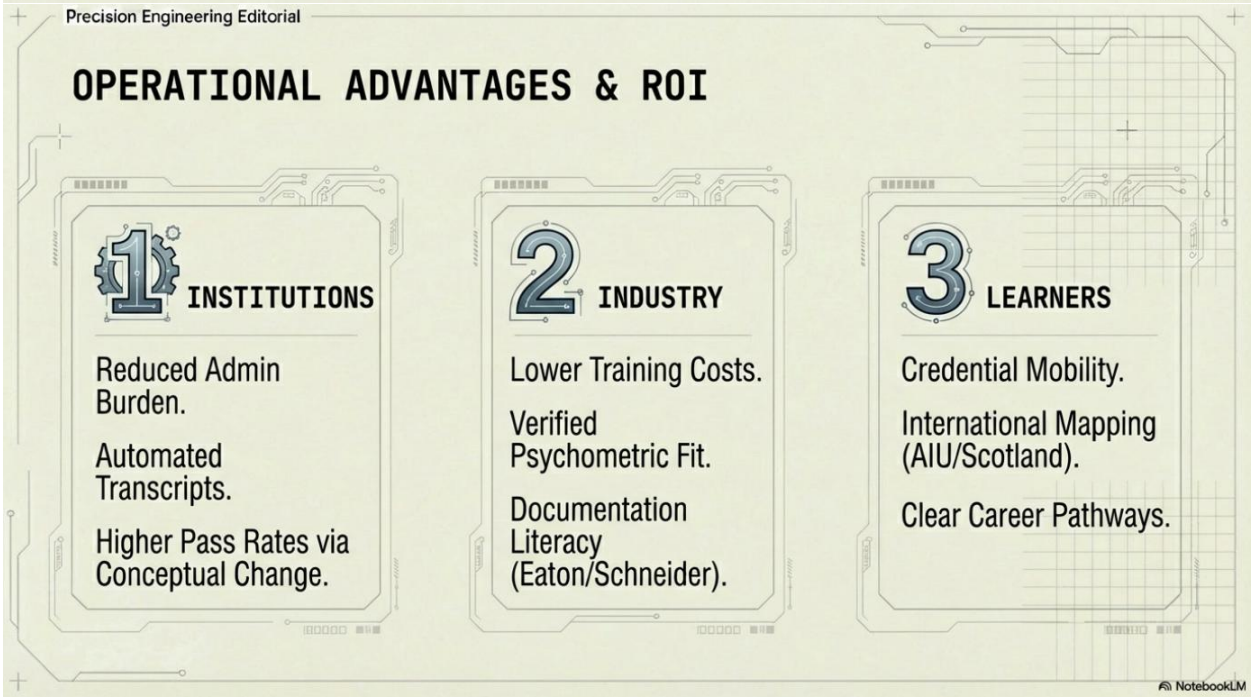

Precision Engineering Editorial
THE FILTER: PSYCHOMETRIC PROFILING
CANDIDATE GRADE RANK
GRADE RANK CALCULATION
COGNITIVE ABILITY
(Visual memory, numerical reasoning)
40%
30%
30%
PERSONALITY TRAITS
(Resilience, impulse control)
INTEGRITY
(Counterproductive behavior screening)
ASSESSMENT STACK
1. 15FQ+ (Personality)
2. PVQ (Values)
3. 3SAQ (Integrity)
PREDICTIVE MODELING
• Reaction Time Reliability: Stroop / AX-CPT Tasks
• Target Application: SAPS (Security), Eskom (Technical), SARS (Audit)
NotebookLM

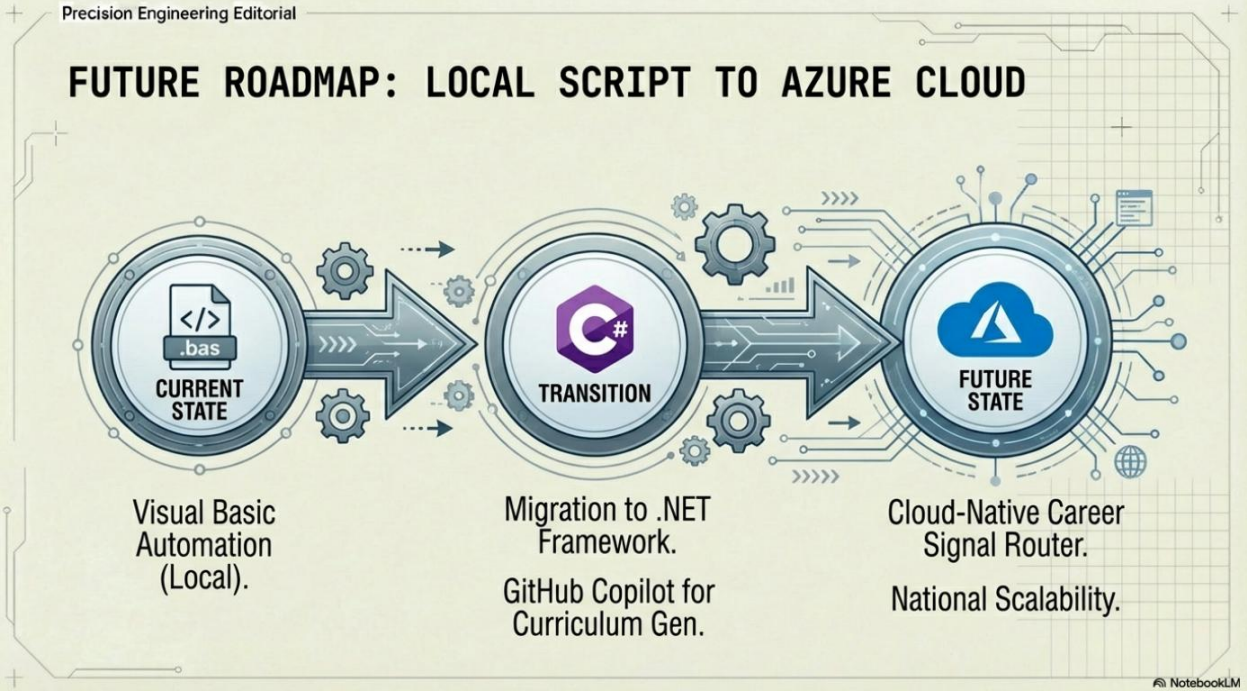

Precision Engineering Editorial
QUANTIFYING INNOVATION: THE DISCOVERY RECORD BOOK
Ledger
Item: Patent Claims
Item: Award Validation (Gold/Platinum)
Item: Inventory Management
Z Impedance:
$Z = rg + jxd$
(Calculates project complexity/resistance)
Power Output:
$P_{max} = \frac{V^2}{4Z}$
(Measures potential impact of learner work)
System Logic: VBA links innovation logs directly to academic transcripts.
NotebookLM

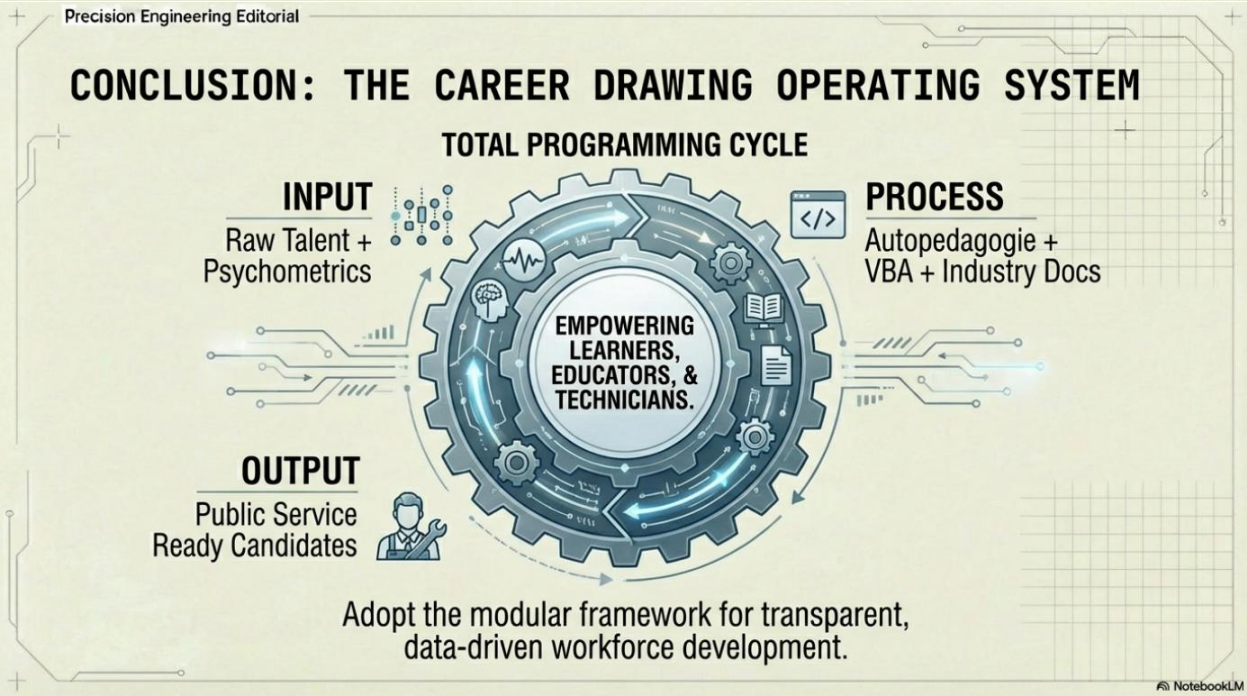

Precision Engineering Editorial
COMPLIANCE OUTPUT: SAQA & DHET MAPPING
INPUT: BACKLOG
Unresolved Nated/NCV records.
repo: memotech-engineering-dhet-saqa
PROCESS: AUTOMATED AUDIT
Mapping to NQF Levels 2–6.
Panel Evaluation Scores.
Validation
OUTPUT: PORTFOLIO
VERIFIED
DHET & SAQA Compliant.
NotebookLM


Precision Engineering Editorial
TARGET OUTPUT: PUBLIC SERVICE & TRADE READINESS
SAPS / METRO POLICE
High Integrity Score
Security & Safety Modules
CITY POWER / ESKOM
Technical Proficiency
Panel Wiring Certification
MICROSOFT / TECH
High Cognitive Score
Data Science Portfolio
Readiness Index = Psychometric Fit + Portfolio Value + Simulation Scores
Readiness Index = Psychometric Fit + Portfolio Value + Simulation Scores
NotebookLM


Precision Engineering Editorial
CASE STUDY: THE ‘BRIGADIER ST PEACE’ REPORT
ON DUTY REPORT
CONFLICT: Architect vs. Engineer (Specs)
→ RESOLVED: Digital Specification Matching
SAFETY: PPE Compliance (Boots/Masks)
→ ENFORCED: Site Security Logs
ADMIN: Learner Kekeletso Missing Forms
DIGITIZED & AUDITABLE
NotebookLM

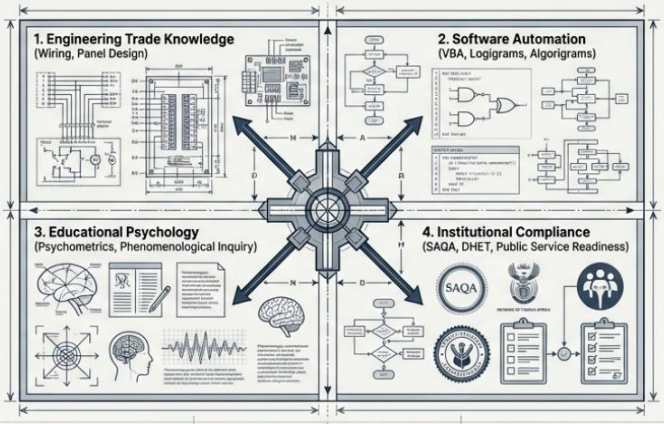

Precision Engineering Editorial
OPERATIONAL ADVANTAGES & ROI
1 INSTITUTIONS
Reduced Admin Burden.
Automated Transcripts.
Higher Pass Rates via Conceptual Change.
2 INDUSTRY
Lower Training Costs.
Verified Psychometric Fit.
Documentation Literacy (Eaton/Schneider).
3 LEARNERS
Credential Mobility.
International Mapping (AIU/Scotland).
Clear Career Pathways.
NotebookLM


Precision Engineering Editorial
FUTURE ROADMAP: LOCAL SCRIPT TO AZURE CLOUD
.bas
CURRENT STATE
TRANSITION
FUTURE STATE
Visual Basic Automation (Local).
Migration to .NET Framework.
GitHub Copilot for Curriculum Gen.
Cloud-Native Career Signal Router.
National Scalability.
NotebookLM


Precision Engineering Editorial
CONCLUSION: THE CAREER DRAWING OPERATING SYSTEM
TOTAL PROGRAMMING CYCLE
INPUT
Raw Talent + Psychometrics
PROCESS
Autopedagogie + VBA + Industry Docs
EMPOWERING LEARNERS, EDUCATORS, & TECHNICIANS.
OUTPUT
Public Service Ready Candidates
Adopt the modular framework for transparent, data-driven workforce development.
NotebookLM

Career Drawing Total Programming: An Integrated Framework for Didactic Autopendagogie

Panel-Based Teaching, Psychometrical Fundamentals, and Phenomenological Engineering Studies



Authored by
Tshingombe Tshitadi Fiston
(Engineering & Education Tech,
SAQA, AIU).

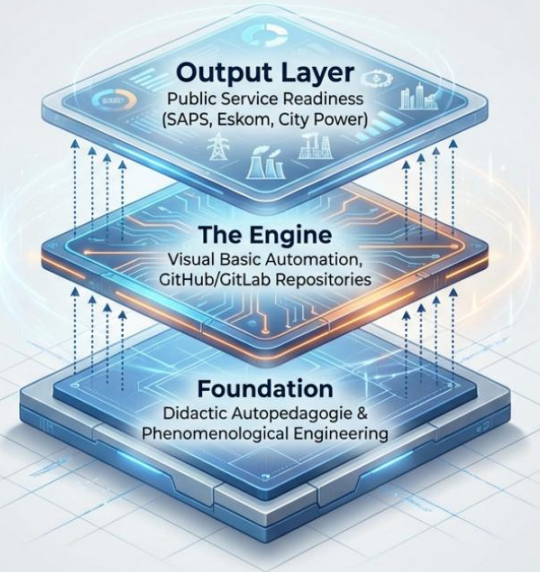
A Credential-Linked System for Audit-Ready Vocational Training.

NotebookLM

The Integrated Systems Architecture

The '**Total Programming**' approach is a dense, interconnected web where engineering trade skills, psychometric data, and software automation converge to validate workforce readiness.

Features **Credential-Linked Pathways**: tracing a student's journey from a line of VBA code to a physical trade test certification.



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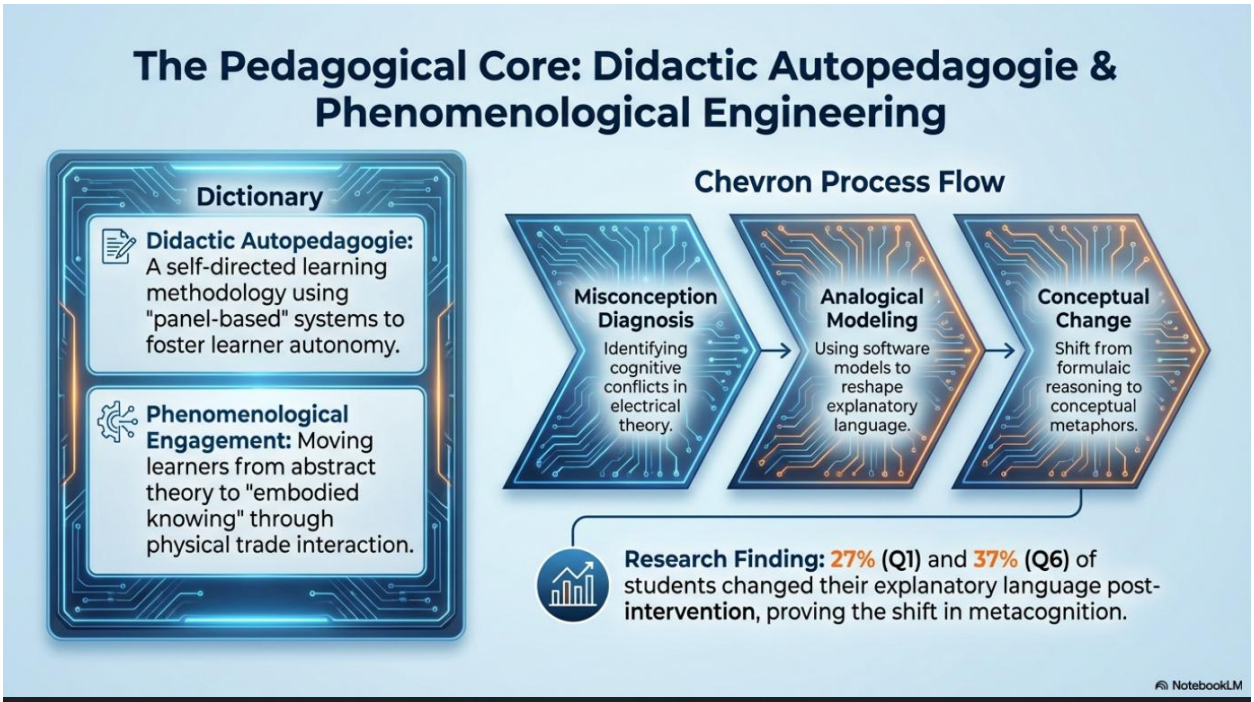
The Pedagogical Core: Didactic Autopedagogie & Phenomenological Engineering
Dictionary
Didactic Autopedagogie: A self-directed learning methodology using "panel-based" systems to foster learner autonomy.
Phenomenological Engineering: Moving learners from abstract theory to "embodied knowing" through physical trade interaction.
Chevron Process Flow
Misconception Diagnosis
Identifying cognitive conflicts in electrical theory.
Analogical Modeling
Using software models to reshape explanatory language.
Conceptual Change
Shift from formulaic reasoning to conceptual metaphors.
Research Finding: 27% (Q1) and 37% (Q6) of students changed their explanatory language post-intervention, proving the shift in metacognition.
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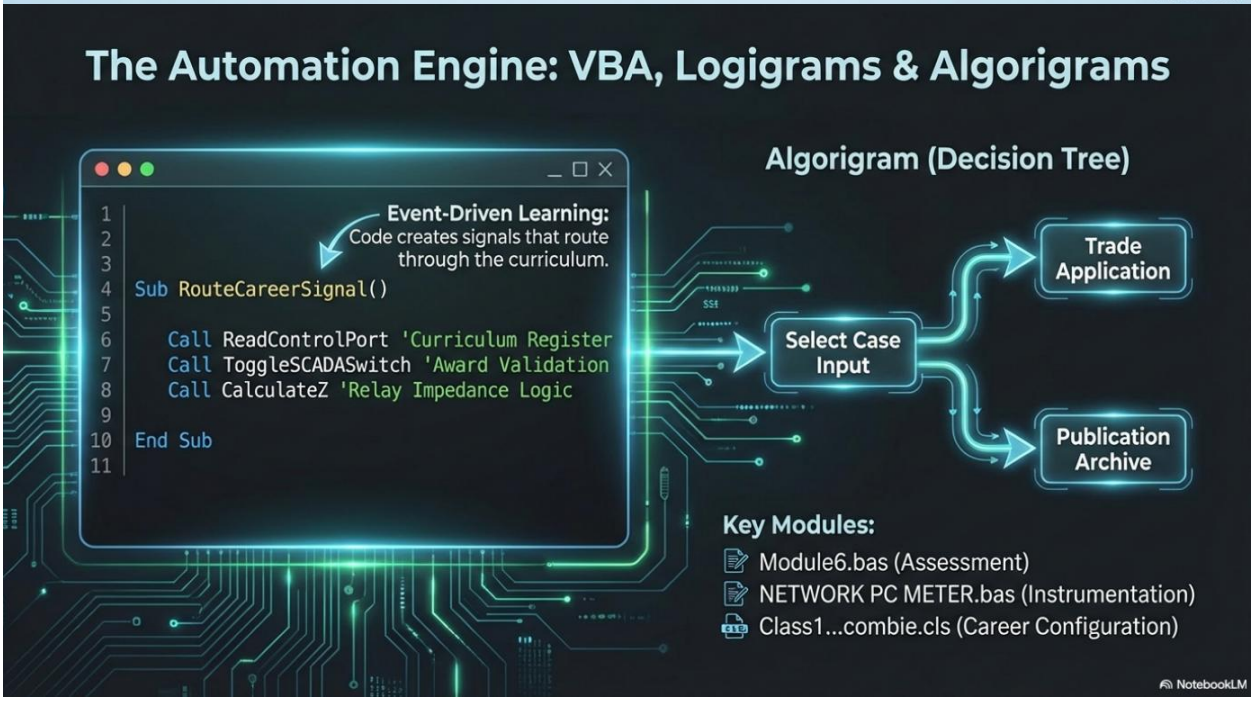
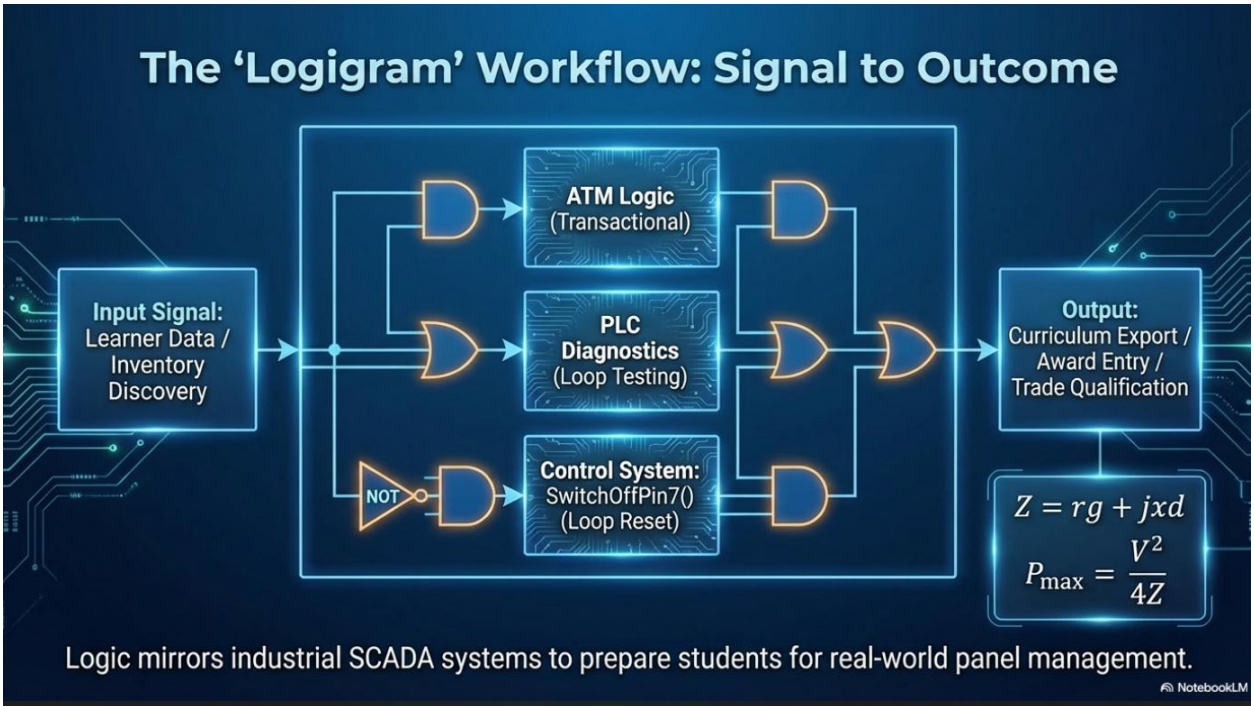
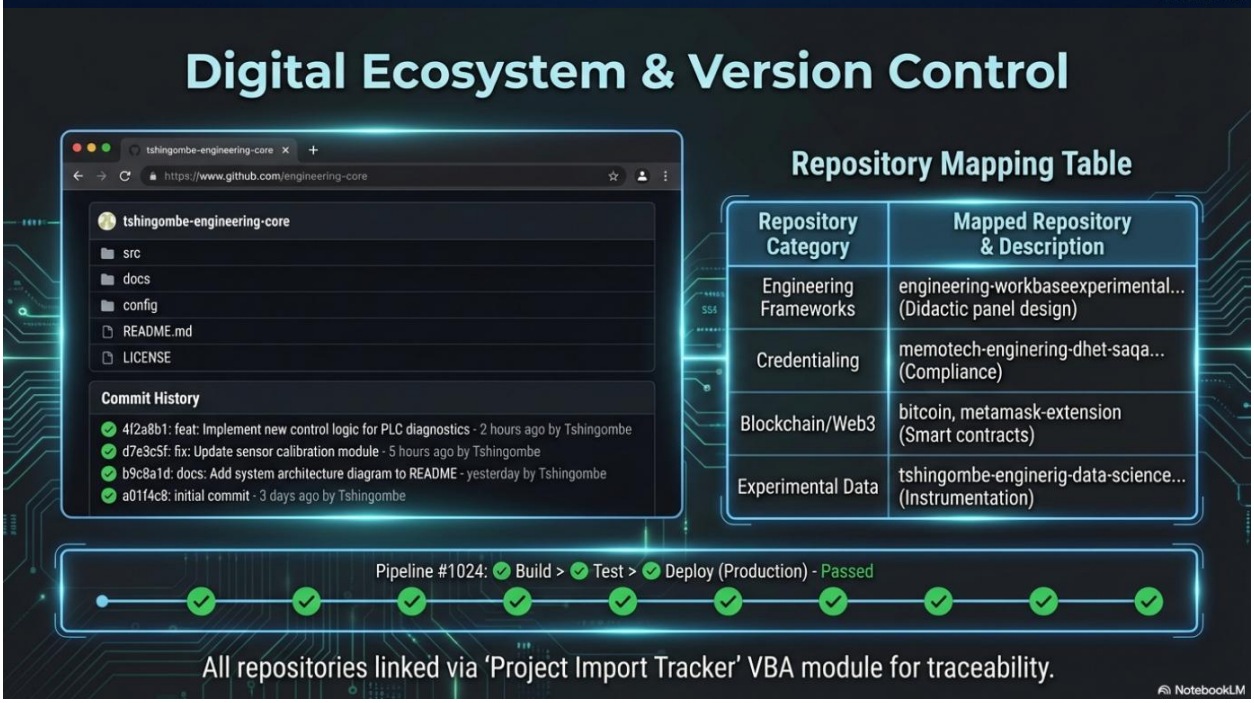
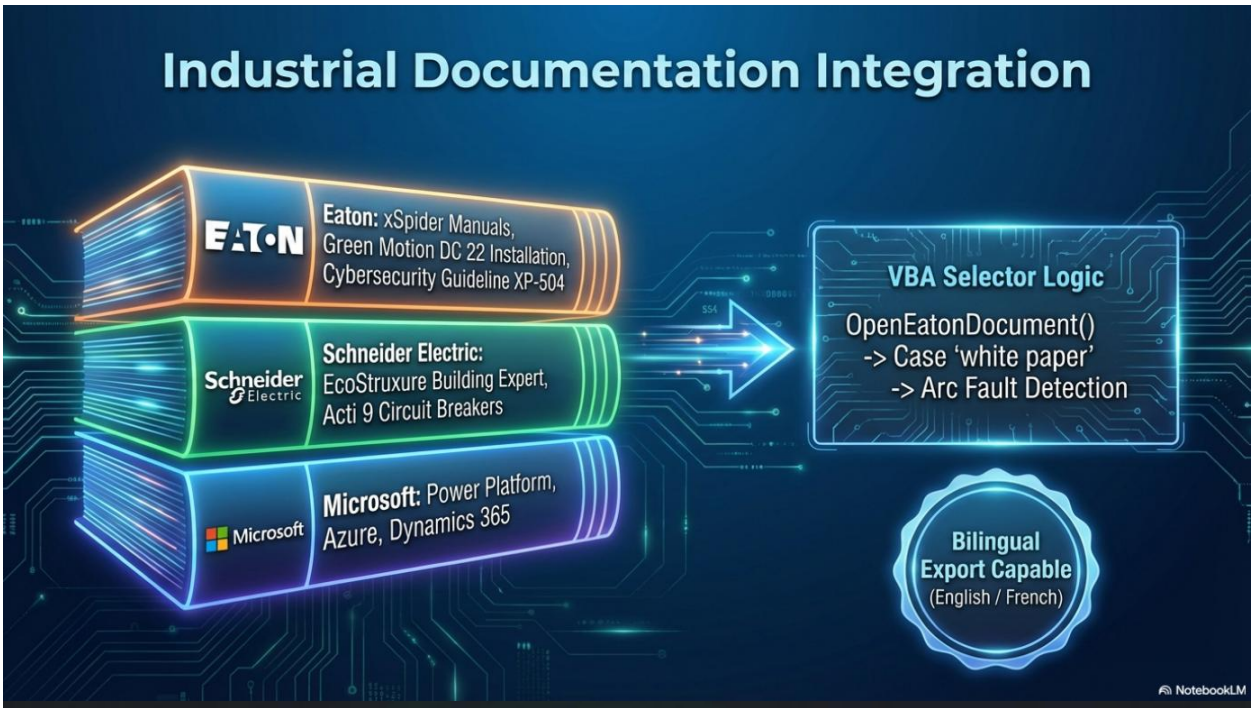
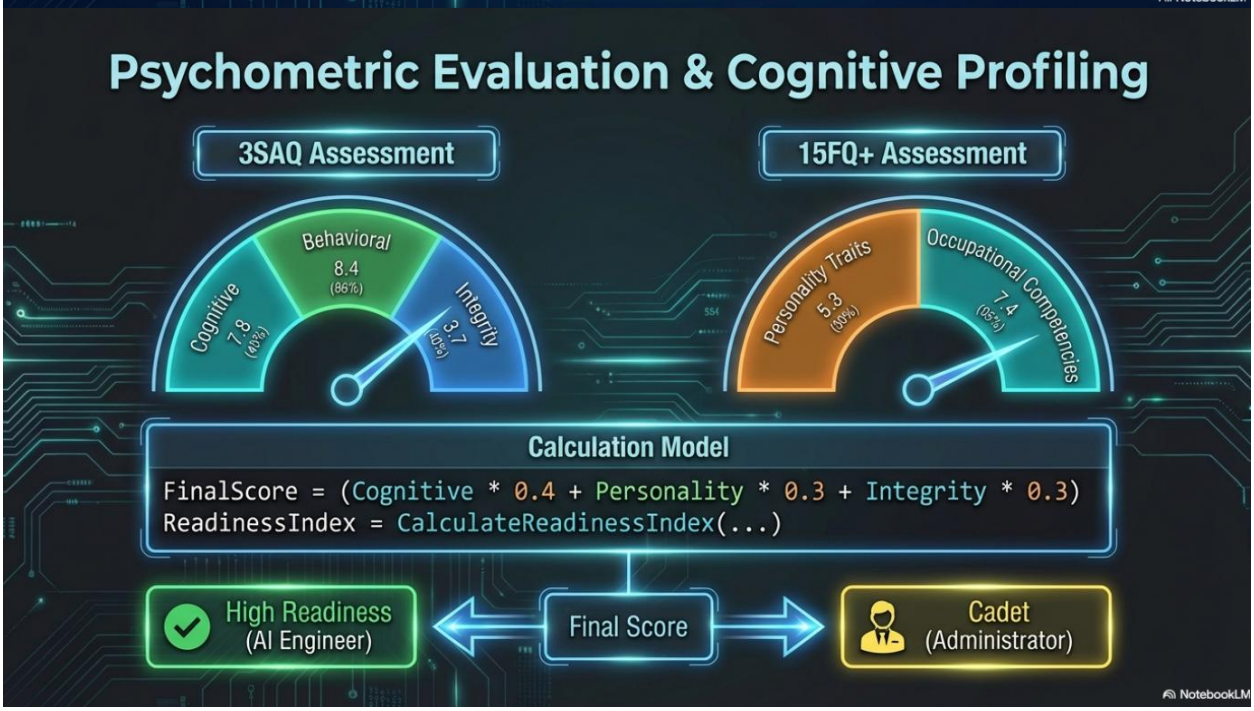
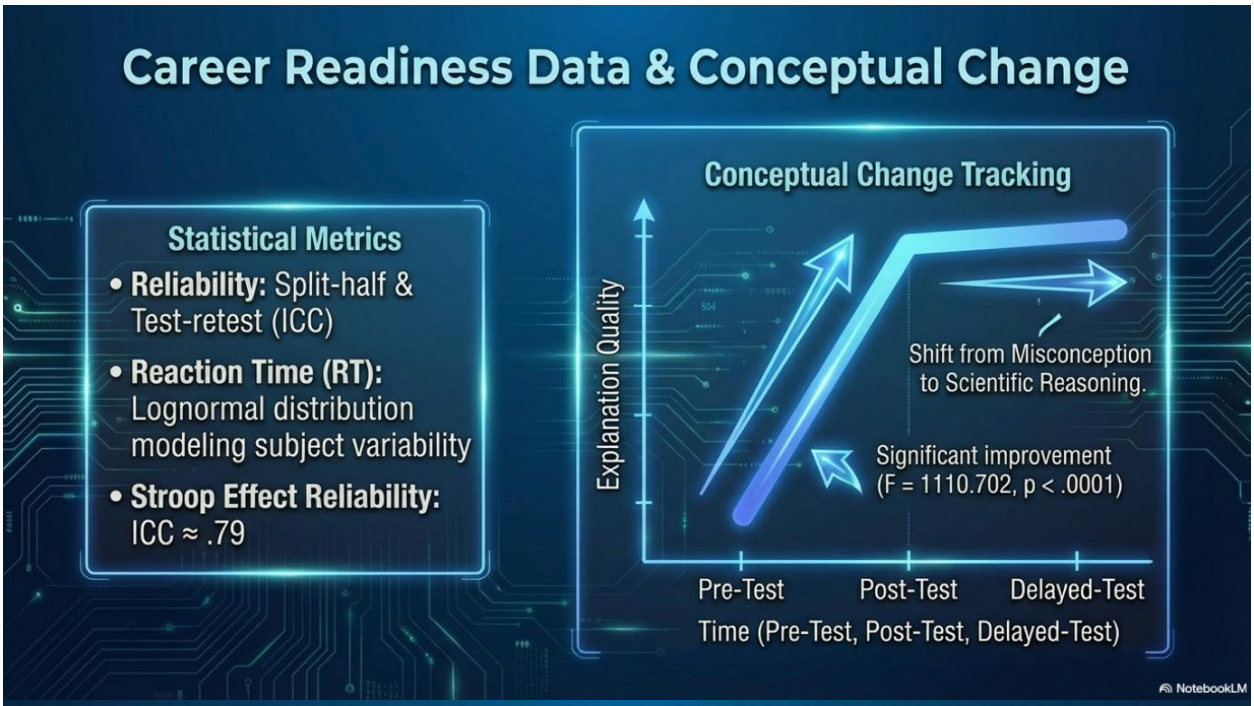

The Automation Engine: VBA, Logigrams & Algorigrams
Event-Driven Learning:
Code creates signals that route through the curriculum.
Sub RouteCareerSignal()
Call ReadControlPort 'Curriculum Register
Call ToggleSCADASwitch 'Award Validation
Call CalculateZ 'Relay Impedance Logic
End Sub
Algorigram (Decision Tree)
Select Case Input
Trade Application
Publication Archive
Key Modules:
Module6.bas (Assessment)
NETWORK PC METER.bas (Instrumentation)
Class1...combie.cls (Career Configuration)
NotebookLM

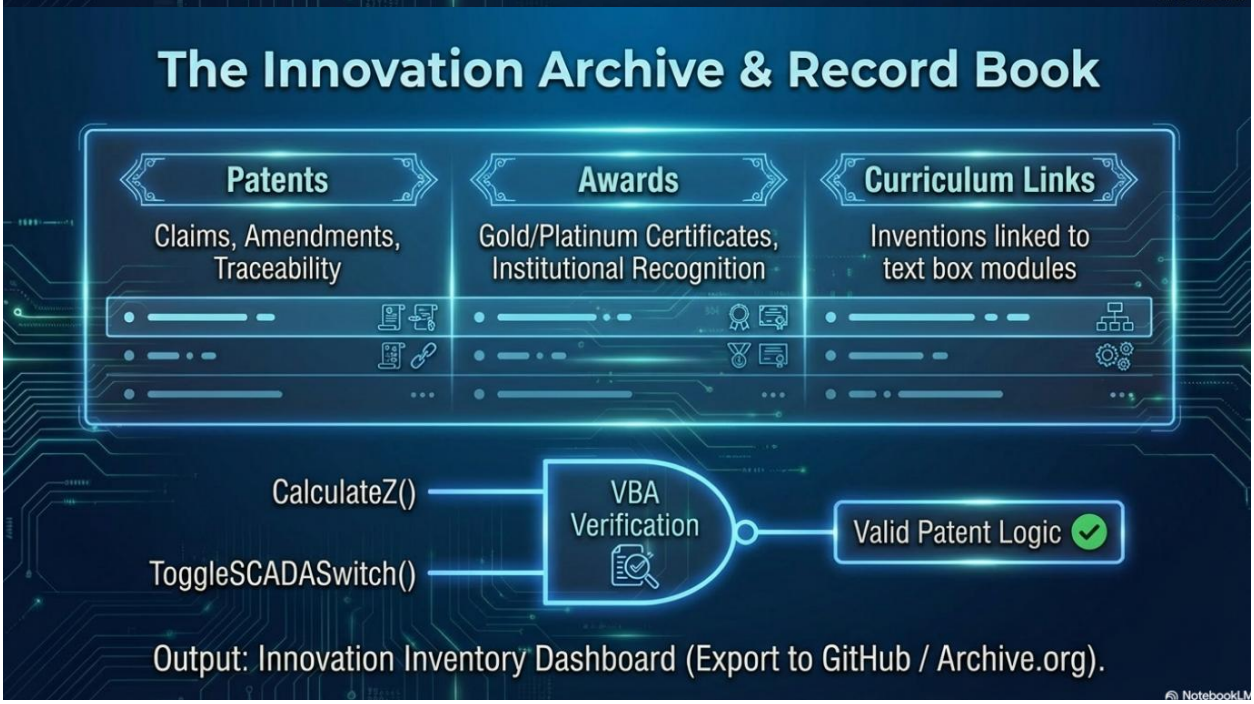

The ‘Logigram’ Workflow: Signal to Outcome
Input Signal: Learner Data / Inventory Discovery
ATM Logic (Transactional)
PLC Diagnostics (Loop Testing)
NOT
Control System: SwitchOffPin7() (Loop Reset)
Output: Curriculum Export / Award Entry / Trade Qualification
$Z = rg + jxd$
$P_{\max} = \frac{V^2}{4Z}$
Logic mirrors industrial SCADA systems to prepare students for real-world panel management.
NotebookLM

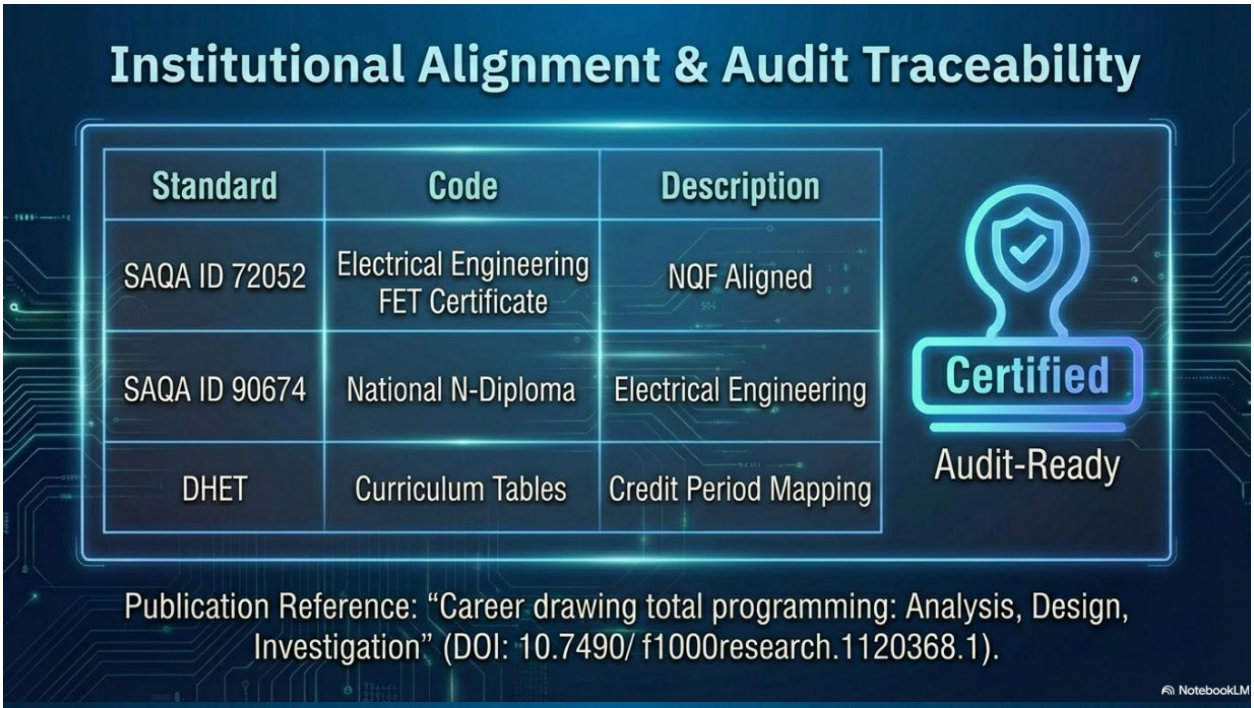

Digital Ecosystem & Version Control
tshingombe-engineering-core
https://www.github.com/engineering-core
tshingombe-engineering-core
src
docs
config
README.md
LICENSE
Commit History
4f2a8b1: feat: Implement new control logic for PLC diagnostics - 2 hours ago by Tshingombe
d7e3c5f: fix: Update sensor calibration module - 5 hours ago by Tshingombe
b9c8a1d: docs: Add system architecture diagram to README - yesterday by Tshingombe
a01f4c8: initial commit - 3 days ago by Tshingombe
Repository Mapping Table
Repository Category
Mapped Repository & Description
Engineering Frameworks
engineering-workbaseexperimental... (Didactic panel design)
Credentialing
memotech-enginering-dhet-saqa... (Compliance)
Blockchain/Web3
bitcoin, metamask-extension (Smart contracts)
Experimental Data
tshingombe-enginerig-data-science... (Instrumentation)
Pipeline #1024: Build > Test > Deploy (Production) - Passed
All repositories linked via ‘Project Import Tracker’ VBA module for traceability.
NotebookLM


Industrial Documentation Integration
Eaton: xSpider Manuals, Green Motion DC 22 Installation, Cybersecurity Guideline XP-504
Schneider Electric: EcoStruxure Building Expert, Acti 9 Circuit Breakers
Microsoft: Power Platform, Azure, Dynamics 365
VBA Selector Logic
OpenEatonDocument()
-> Case 'white paper'
-> Arc Fault Detection
Bilingual Export Capable
(English / French)
NotebookLM

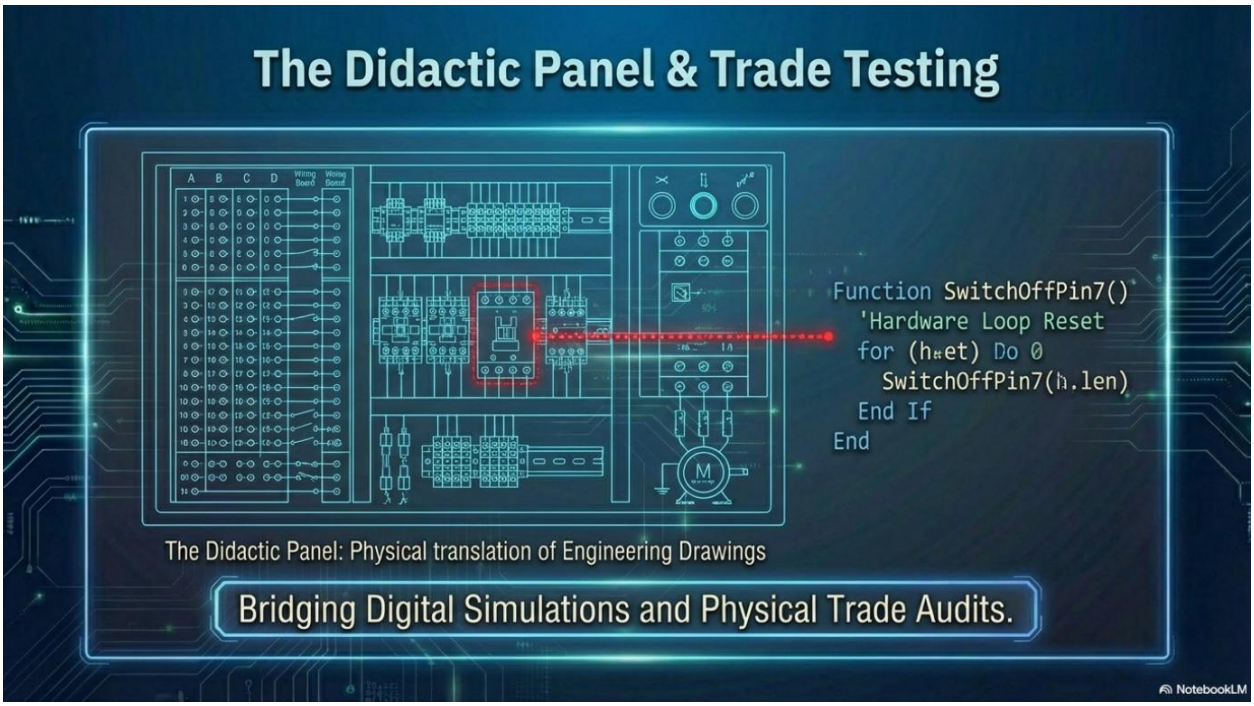

Psychometric Evaluation & Cognitive Profiling
3SAQ Assessment
15FQ+ Assessment
Cognitive
Behavioral
8.4
(86%)
Integrity
3.7
Personality Traits
5.3
Occupational Competencies
7.4
Calculation Model
FinalScore = (Cognitive * 0.4 + Personality * 0.3 + Integrity * 0.3)
ReadinessIndex = CalculateReadinessIndex(...)
High Readiness
(AI Engineer)
Final Score
Cadet
(Administrator)
NotebookLM

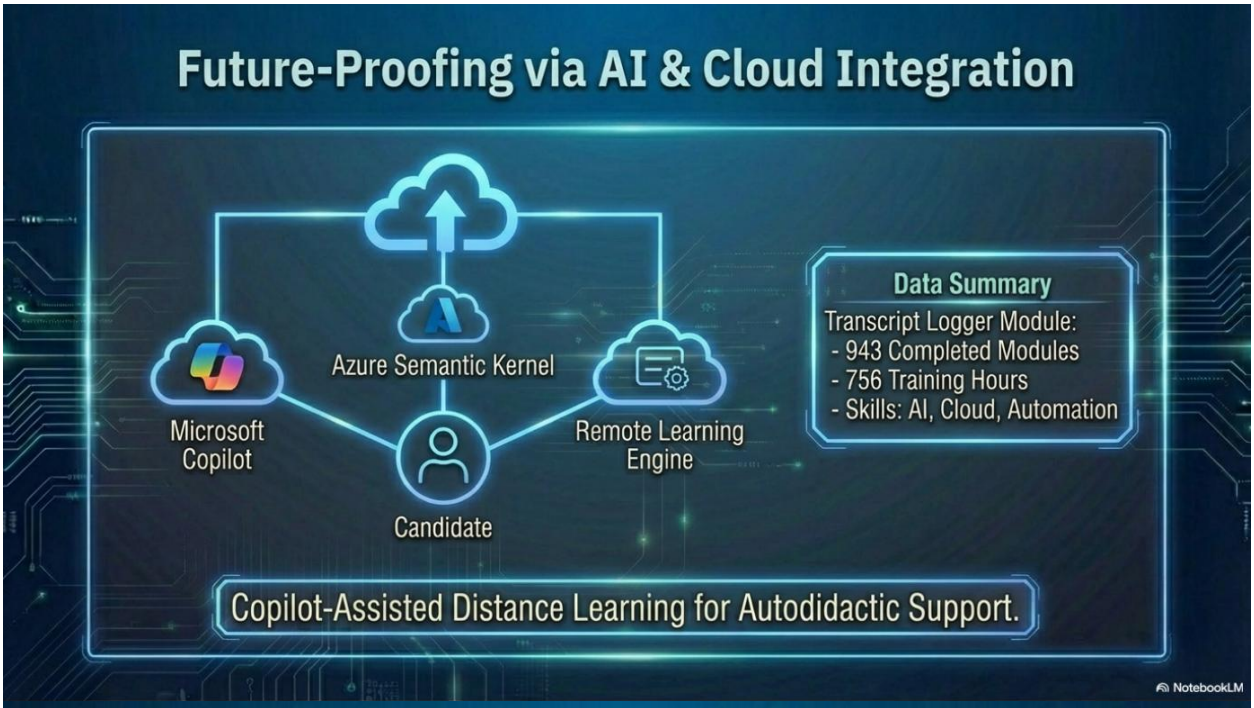

Career Readiness Data & Conceptual Change
Statistical Metrics
• Reliability: Split-half & Test-retest (ICC)
• Reaction Time (RT): Lognormal distribution modeling subject variability
• Stroop Effect Reliability: ICC ≈ .79
Conceptual Change Tracking
Explanation Quality
Shift from Misconception to Scientific Reasoning.
Significant improvement (F = 1110.702, p < .0001)
Pre-Test
Post-Test
Delayed-Test
Time (Pre-Test, Post-Test, Delayed-Test)
NotebookLM

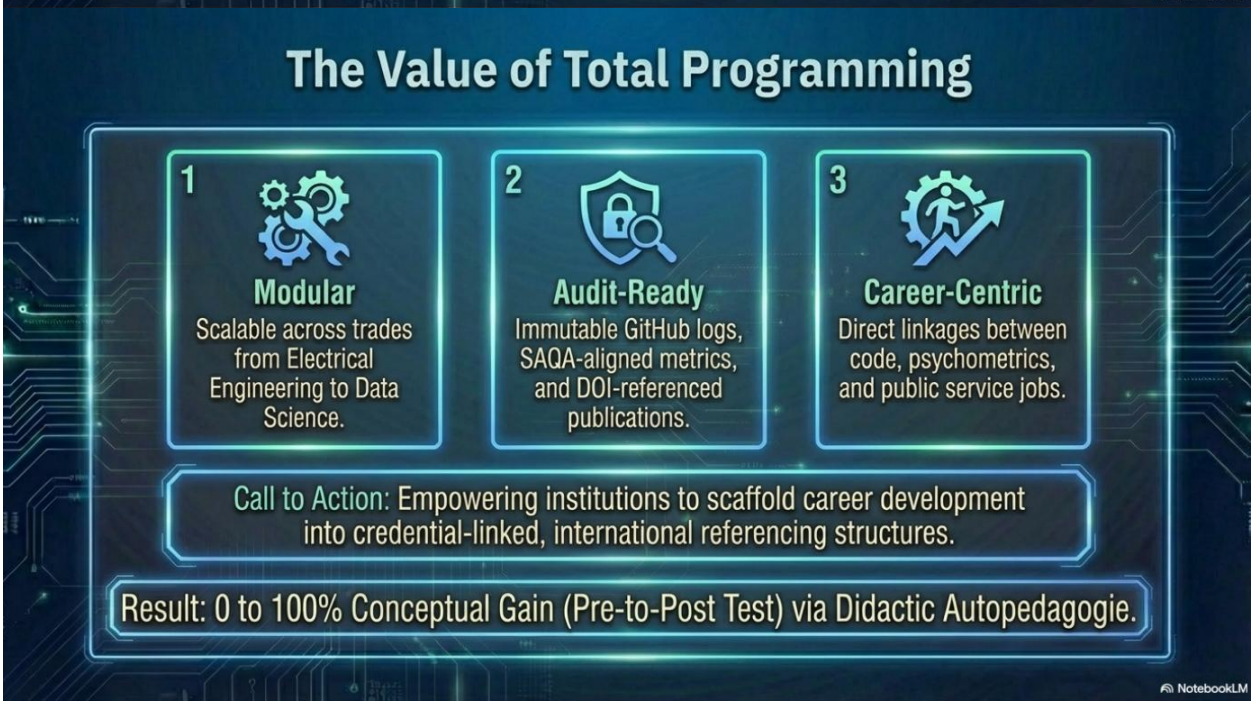

The Innovation Archive & Record Book
Patents
Claims, Amendments, Traceability
Awards
Gold/Platinum Certificates, Institutional Recognition
Curriculum Links
Inventions linked to text box modules
CalculateZ()
ToggleSCADASwitch()
VBA Verification
Valid Patent Logic
Output: Innovation Inventory Dashboard (Export to GitHub / Archive.org).
NotebookLM

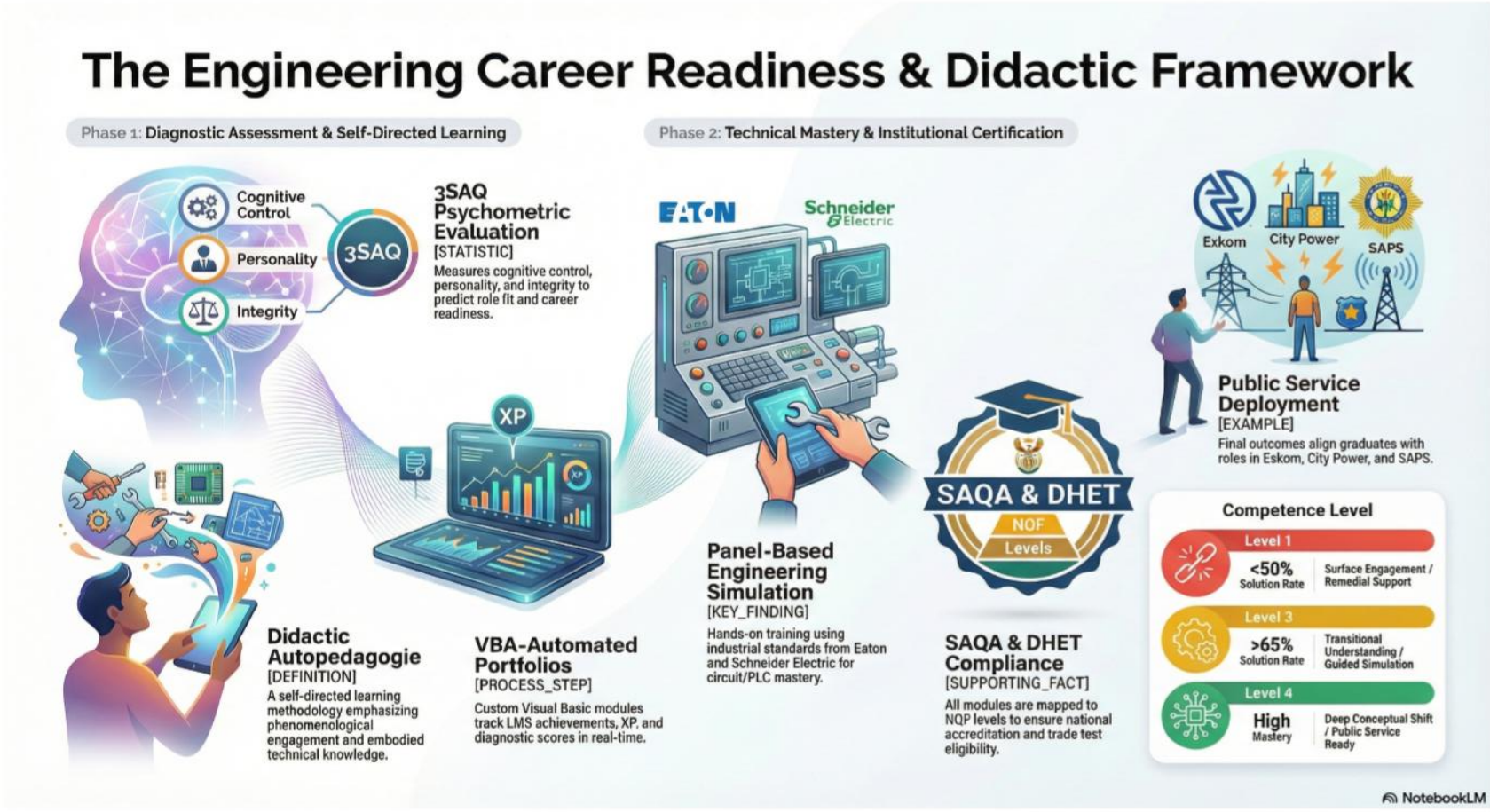

Institutional Alignment & Audit Traceability
Standard
Code
Description
SAQA ID 72052
Electrical Engineering FET Certificate
NQF Aligned
SAQA ID 90674
National N-Diploma
Electrical Engineering
DHET
Curriculum Tables
Credit Period Mapping
Certified
Audit-Ready
Publication Reference: "Career drawing total programming: Analysis, Design, Investigation" (DOI: 10.7490/ f1000research.1120368.1).
NotebookLM

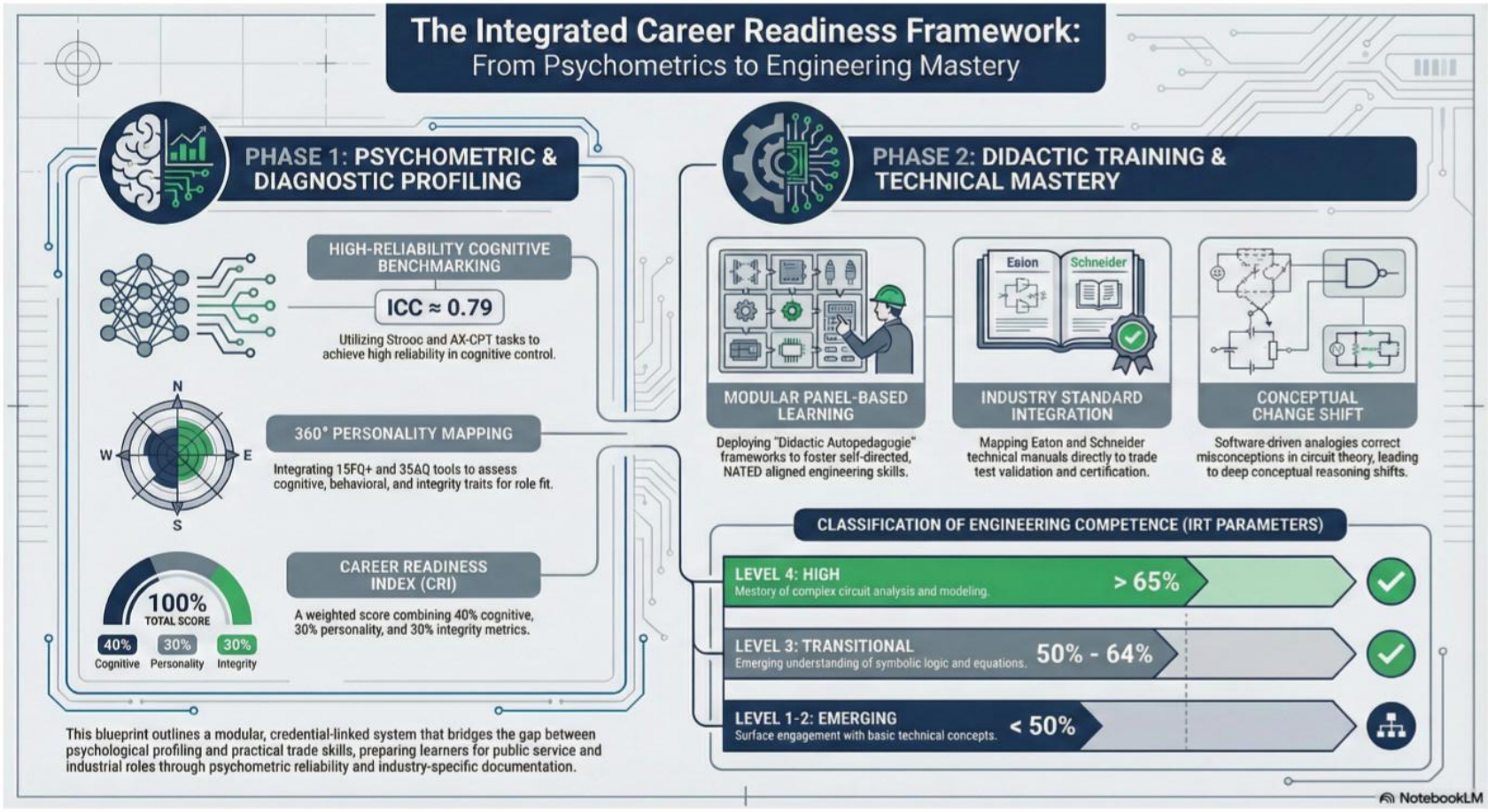
Public Service & Industry Readiness
Trade Testing: Panel Wiring, Instrumentation
City Power / Eskom
Job Simulation
Real-world fault detection scenarios (e.g., 3-phase motor) embedded in software.
IP Class: Public Safety & Integrity Screening
POLICE
SAPS / Metro Police
Candidate
Recruitment: Portfolio Audits, Psychometrics
VBA Recruitment Logic
GetRecruitmentFocus('SAPS') -> Returns 'Public Safety'
SARS / SARB
NotebookLM

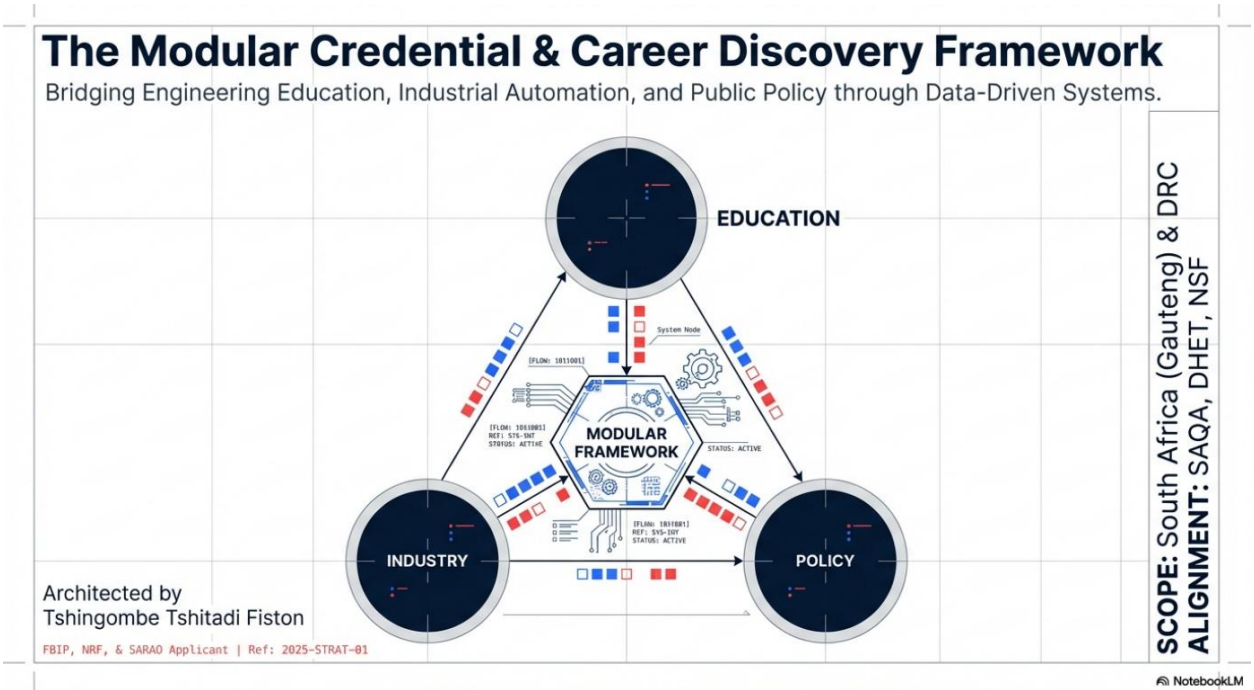

The Didactic Panel & Trade Testing
Function SwitchOffPin7()
'Hardware Loop Reset
for (h#et) Do 0
SwitchOffPin7(h.len)
End If
End
The Didactic Panel: Physical translation of Engineering Drawings
Bridging Digital Simulations and Physical Trade Audits.
NotebookLM

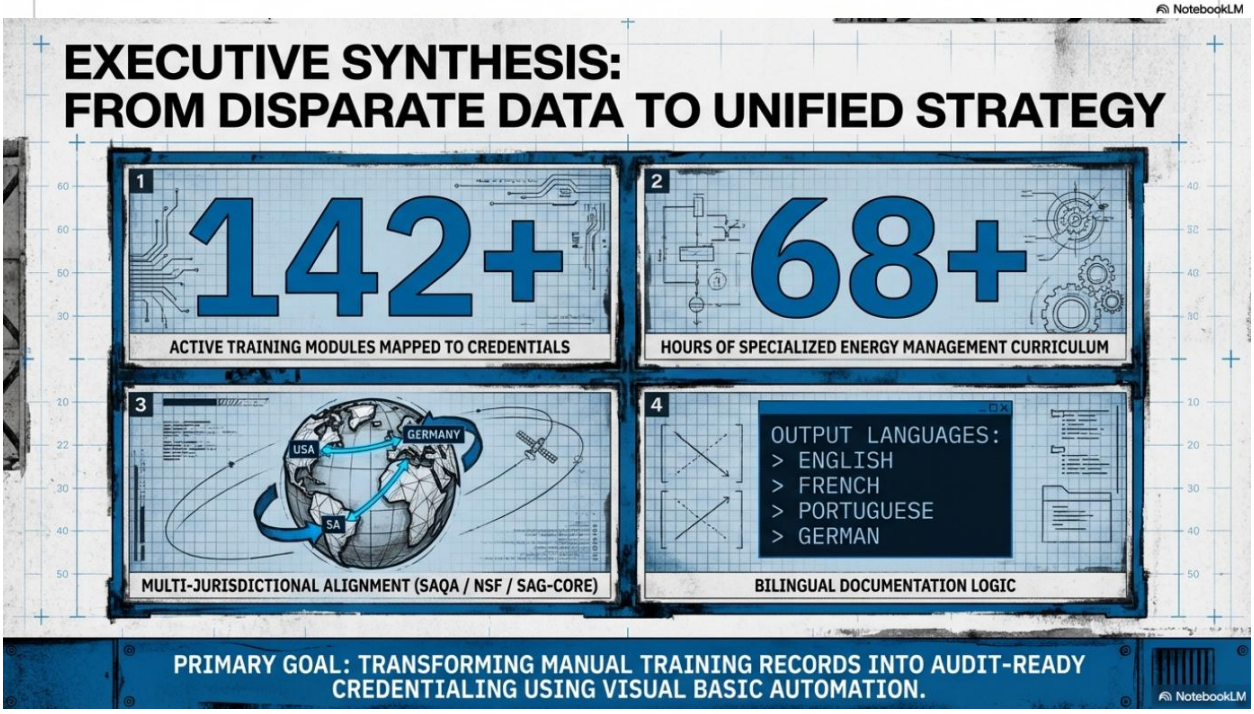

Future-Proofing via AI & Cloud Integration
Azure Semantic Kernel
Microsoft Copilot
Remote Learning Engine
Candidate
Data Summary
Transcript Logger Module:
- 943 Completed Modules
- 756 Training Hours
- Skills: AI, Cloud, Automation
Copilot-Assisted Distance Learning for Autodidactic Support.
NotebookLM

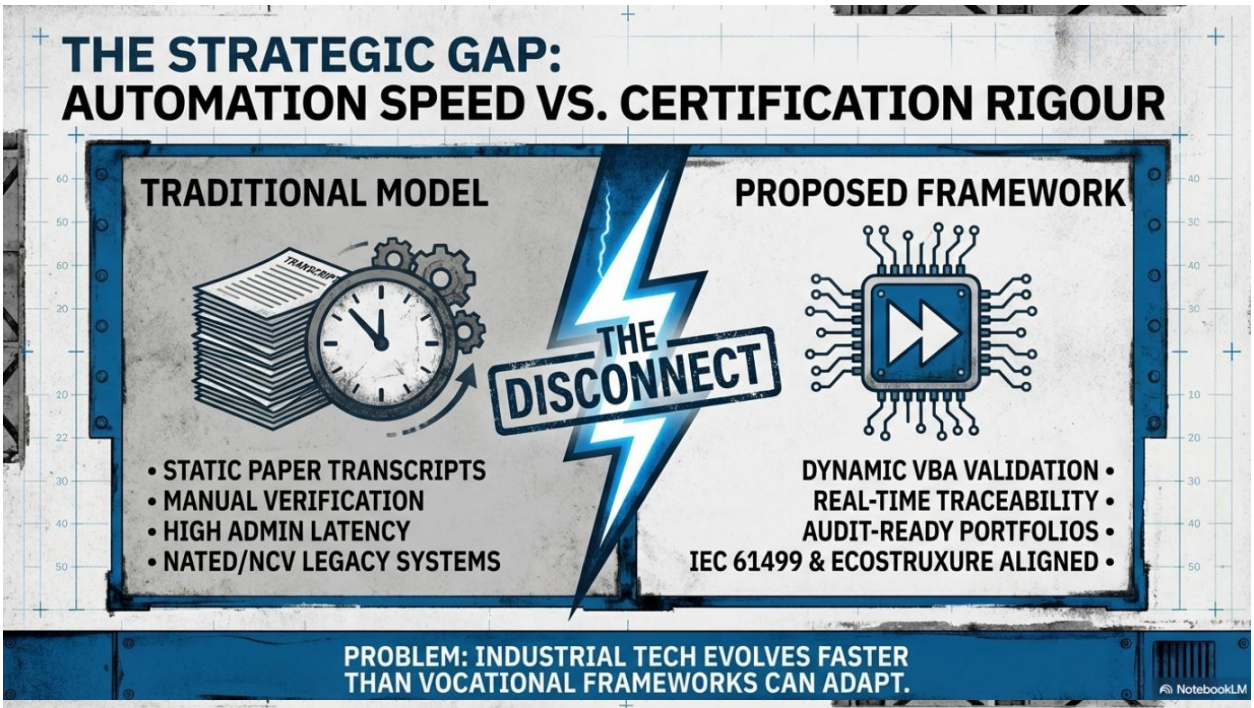

The Value of Total Programming
1
Modular
Scalable across trades from Electrical Engineering to Data Science.
2
Audit-Ready
Immutable GitHub logs, SAQA-aligned metrics, and DOI-referenced publications.
3
Career-Centric
Direct linkages between code, psychometrics, and public service jobs.
Call to Action: Empowering institutions to scaffold career development into credential-linked, international referencing structures.
Result: 0 to 100% Conceptual Gain (Pre-to-Post Test) via Didactic Autopedagogie.
NotebookLM

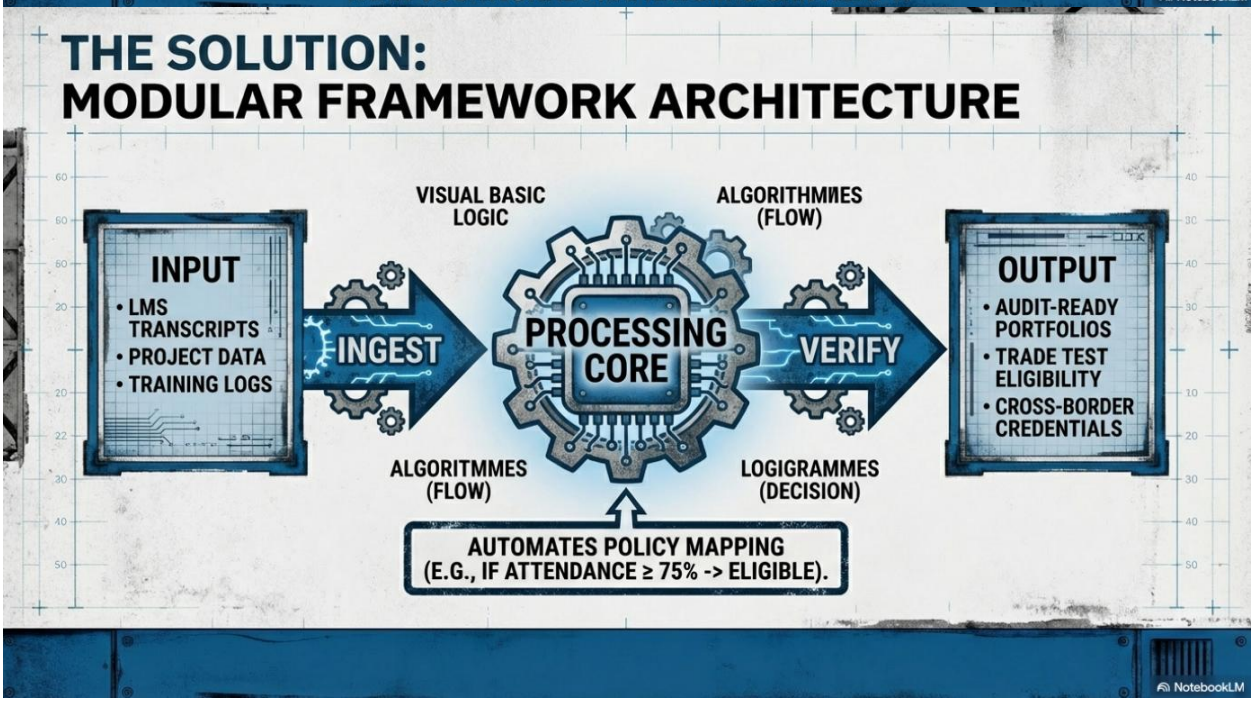

The Engineering Career Readiness & Didactic Framework
Phase 1: Diagnostic Assessment & Self-Directed Learning
Phase 2: Technical Mastery & Institutional Certification
Cognitive Control
Personality
Integrity
3SAQ
3SAQ Psychometric Evaluation
[STATISTIC]
Measures cognitive control, personality, and integrity to predict role fit and career readiness.
XP
Didactic Autopedagogie
[DEFINITION]
A self-directed learning methodology emphasizing phenomenological engagement and embodied technical knowledge.
VBA-Automated Portfolios
[PROCESS_STEP]
Custom Visual Basic modules track LMS achievements, XP, and diagnostic scores in real-time.
EATON
Schneider Electric
Panel-Based Engineering Simulation
[KEY_FINDING]
Hands-on training using industrial standards from Eaton and Schneider Electric for circuit/PLC mastery.
SAQA & DHET
NQF Levels
SAQA & DHET Compliance
[SUPPORTING_FACT]
All modules are mapped to NQP levels to ensure national accreditation and trade test eligibility.
Exkom
City Power
SAPS
Public Service Deployment
[EXAMPLE]
Final outcomes align graduates with roles in Eskom, City Power, and SAPS.
Competence Level
Level 1
<50% Solution Rate
Surface Engagement / Remedial Support
Level 3
>65% Solution Rate
Transitional Understanding / Guided Simulation
Level 4
High Mastery
Deep Conceptual Shift / Public Service Ready
NotebookLM

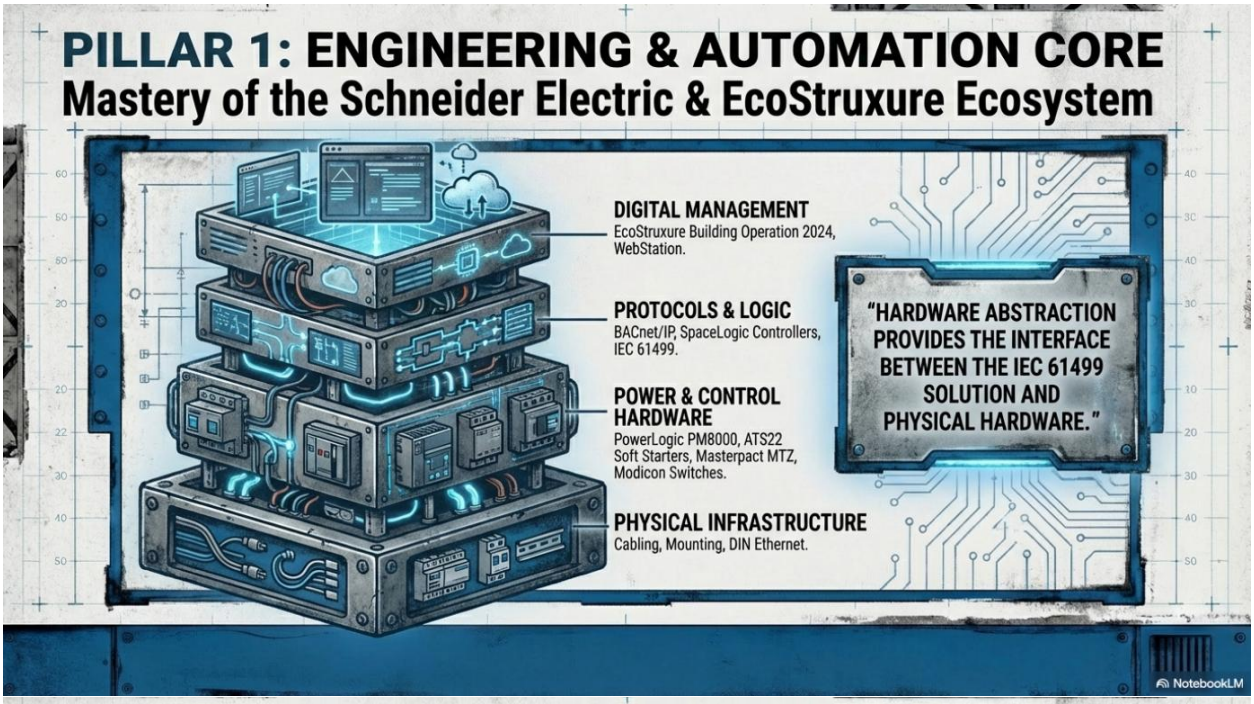

The Integrated Career Readiness Framework:
From Psychometrics to Engineering Mastery
PHASE 1: PSYCHOMETRIC & DIAGNOSTIC PROFILING
HIGH-RELIABILITY COGNITIVE BENCHMARKING
ICC ≈ 0.79
Utilizing Strooc and AX-CPT tasks to achieve high reliability in cognitive control.
N
W
E
S
360° PERSONALITY MAPPING
Integrating 15FQ+ and 35AQ tools to assess cognitive, behavioral, and integrity traits for role fit.
100%
TOTAL SCORE
40%
Cognitive
30%
Personality
30%
Integrity
CAREER READINESS INDEX (CRI)
A weighted score combining 40% cognitive, 30% personality, and 30% integrity metrics.
This blueprint outlines a modular, credential-linked system that bridges the gap between psychological profiling and practical trade skills, preparing learners for public service and industrial roles through psychometric reliability and industry-specific documentation.
PHASE 2: DIDACTIC TRAINING & TECHNICAL MASTERY
MODULAR PANEL-BASED LEARNING
Deploying "Didactic Autopedagogie" frameworks to foster self-directed, NATED aligned engineering skills.
Eaton
Schneider
INDUSTRY STANDARD INTEGRATION
Mapping Eaton and Schneider technical manuals directly to trade test validation and certification.
CONCEPTUAL CHANGE SHIFT
Software-driven analogies correct misconceptions in circuit theory, leading to deep conceptual reasoning shifts.
CLASSIFICATION OF ENGINEERING COMPETENCE (IRT PARAMETERS)
LEVEL 4: HIGH
Mastery of complex circuit analysis and modeling.
> 65%
LEVEL 3: TRANSITIONAL
Emerging understanding of symbolic logic and equations.
50% - 64%
LEVEL 1-2: EMERGING
Surface engagement with basic technical concepts.
< 50%
NotebookLM

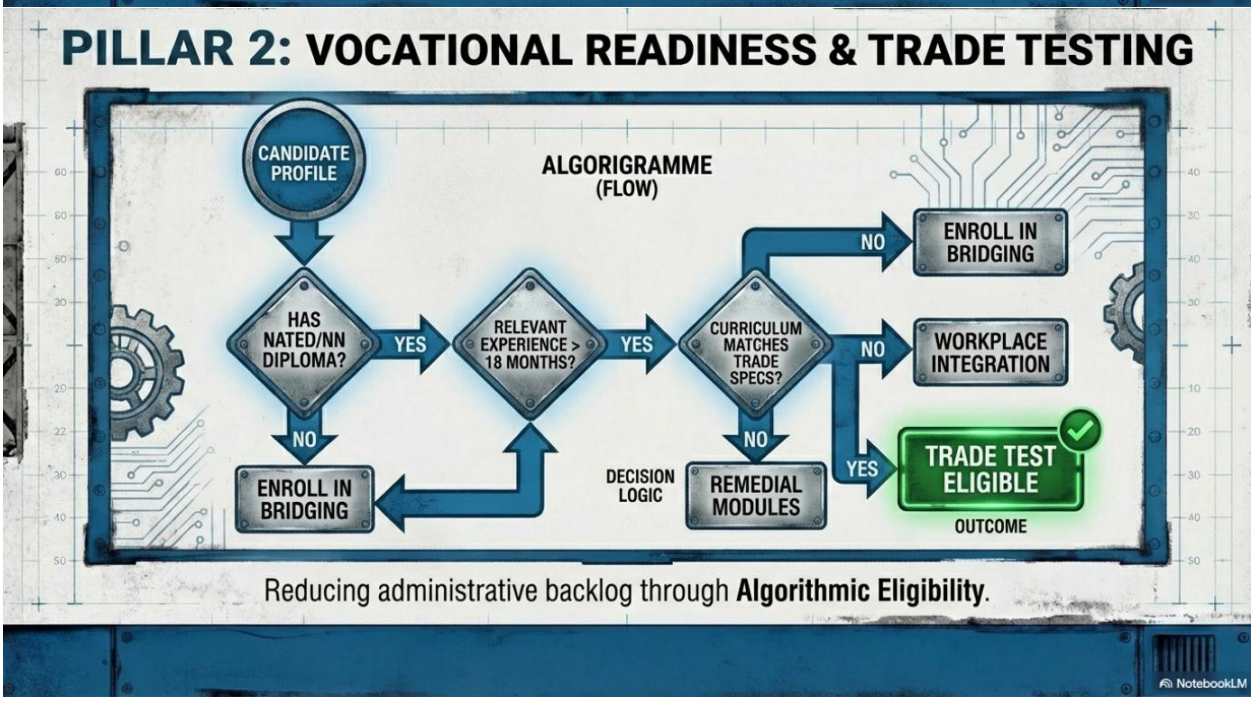

The Modular Credential & Career Discovery Framework
Bridging Engineering Education, Industrial Automation, and Public Policy through Data-Driven Systems.
EDUCATION
INDUSTRY
POLICY
MODULAR FRAMEWORK
SCOPE: South Africa (Gauteng) & DRC
ALIGNMENT: SAQA, DHET, NSF
Architected by
Tshingombe Tshitadi Fiston
FBIP, NRF, & SARAO Applicant | Ref: 2025-STRAT-01
NotebookLM


EXECUTIVE SYNTHESIS:
FROM DISPARATE DATA TO UNIFIED STRATEGY
1
142+
ACTIVE TRAINING MODULES MAPPED TO CREDENTIALS
2
68+
HOURS OF SPECIALIZED ENERGY MANAGEMENT CURRICULUM
3
USA
GERMANY
SA
MULTI-JURISDICTIONAL ALIGNMENT (SAQA / NSF / SAG-CORE)
4
OUTPUT LANGUAGES:
> ENGLISH
> FRENCH
> PORTUGUESE
> GERMAN
BILINGUAL DOCUMENTATION LOGIC
PRIMARY GOAL: TRANSFORMING MANUAL TRAINING RECORDS INTO AUDIT-READY CREDENTIALING USING VISUAL BASIC AUTOMATION.
NotebookLM

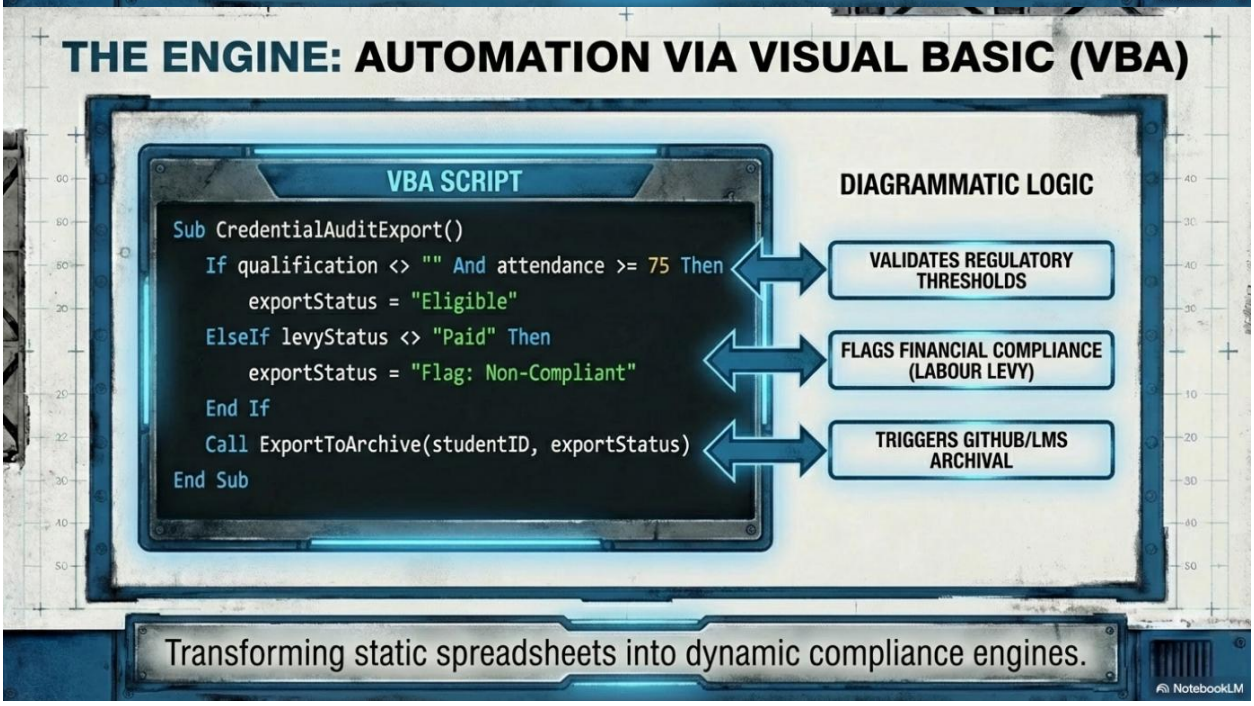

THE STRATEGIC GAP:
AUTOMATION SPEED VS. CERTIFICATION RIGOUR
TRADITIONAL MODEL
PROPOSED FRAMEWORK
THE DISCONNECT
• STATIC PAPER TRANSCRIPTS
• MANUAL VERIFICATION
• HIGH ADMIN LATENCY
• NATED/NCV LEGACY SYSTEMS
DYNAMIC VBA VALIDATION •
REAL-TIME TRACEABILITY •
AUDIT-READY PORTFOLIOS •
IEC 61499 & ECOSTRUXURE ALIGNED •
PROBLEM: INDUSTRIAL TECH EVOLVES FASTER
THAN VOCATIONAL FRAMEWORKS CAN ADAPT.
NotebookLM


THE SOLUTION:
MODULAR FRAMEWORK ARCHITECTURE
VISUAL BASIC LOGIC
ALGORITHMMES (FLOW)
INPUT
• LMS TRANSCRIPTS
• PROJECT DATA
• TRAINING LOGS
INGEST
PROCESSING CORE
VERIFY
OUTPUT
• AUDIT-READY PORTFOLIOS
• TRADE TEST ELIGIBILITY
• CROSS-BORDER CREDENTIALS
ALGORITMMES (FLOW)
LOGIGRAMMES (DECISION)
AUTOMATES POLICY MAPPING
(E.G., IF ATTENDANCE ≥ 75% -> ELIGIBLE).
NotebookLM

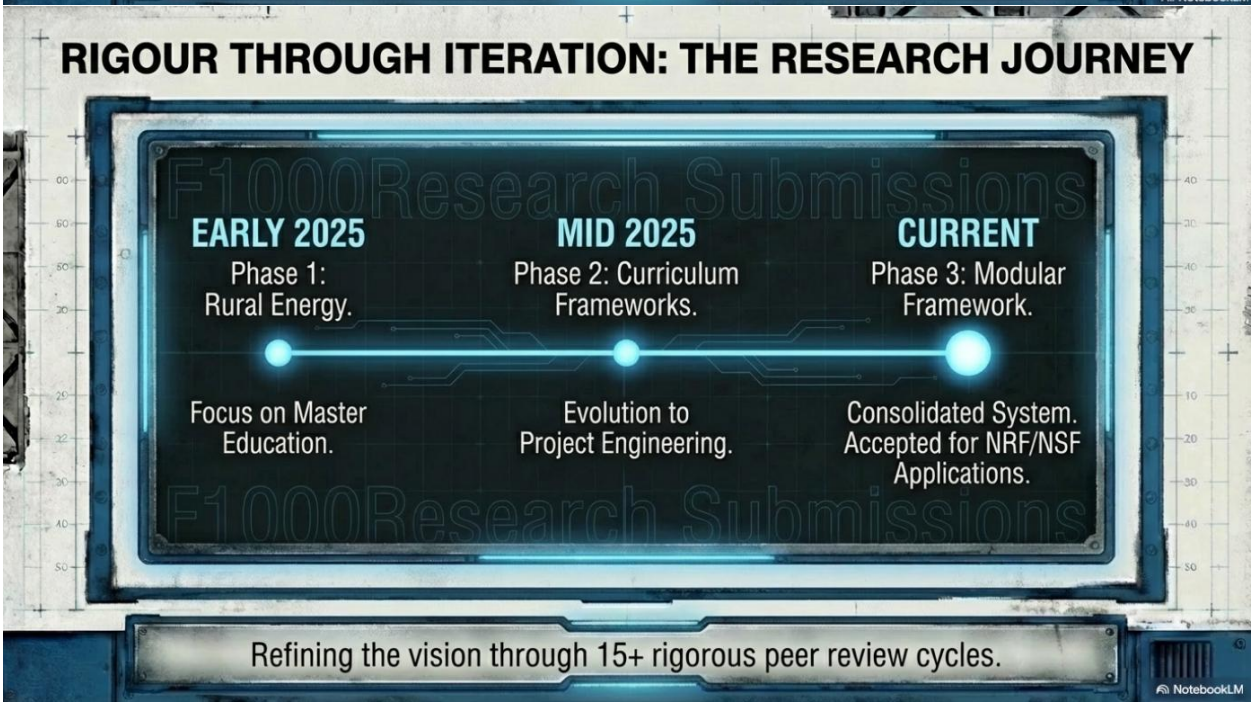

PILLAR 1: ENGINEERING & AUTOMATION CORE
Mastery of the Schneider Electric & EcoStruxure Ecosystem
DIGITAL MANAGEMENT
EcoStruxure Building Operation 2024, WebStation.
PROTOCOLS & LOGIC
BACnet/IP, SpaceLogic Controllers, IEC 61499.
POWER & CONTROL HARDWARE
PowerLogic PM8000, ATS22 Soft Starters, Masterpact MTZ, Modicon Switches.
PHYSICAL INFRASTRUCTURE
Cabling, Mounting, DIN Ethernet.
"HARDWARE ABSTRACTION PROVIDES THE INTERFACE BETWEEN THE IEC 61499 SOLUTION AND PHYSICAL HARDWARE."
NotebookLM

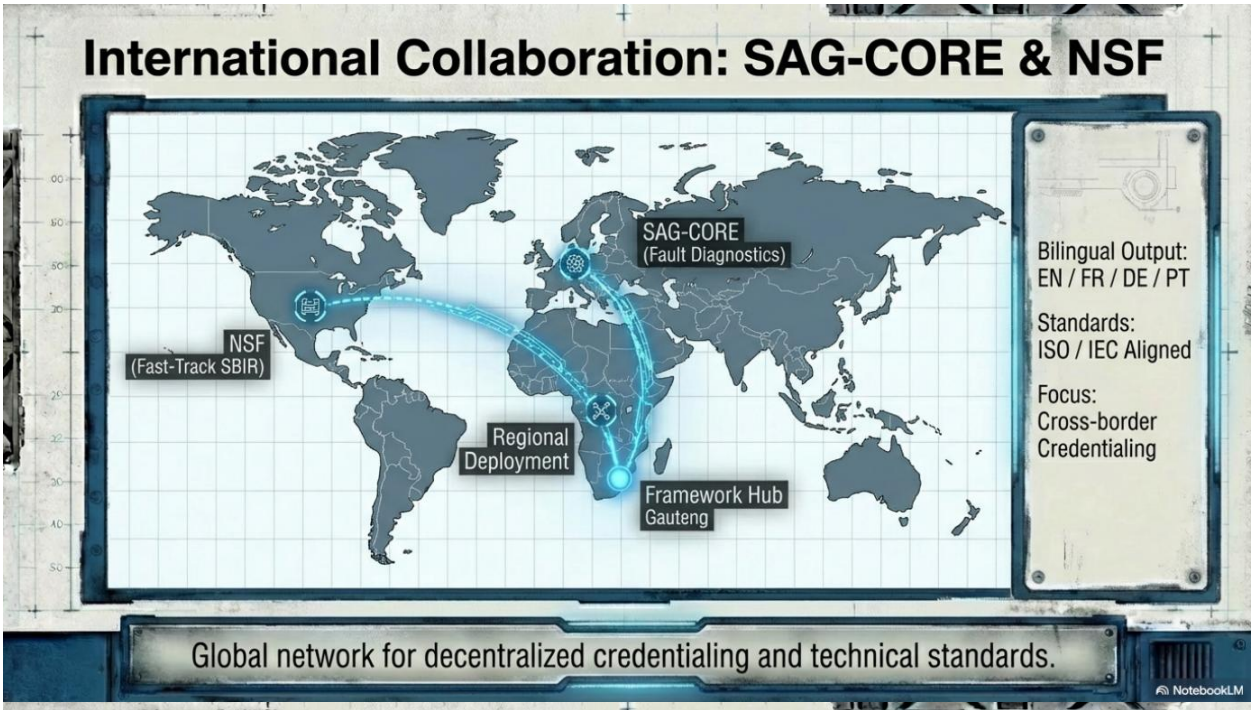

PILLAR 2: VOCATIONAL READINESS & TRADE TESTING
CANDIDATE PROFILE
ALGORIGRAMME (FLOW)
HAS NATED/NN DIPLOMA?
YES
RELEVANT EXPERIENCE > 18 MONTHS?
YES
CURRICULUM MATCHES TRADE SPECS?
NO
ENROLL IN BRIDGING
NO
WORKPLACE INTEGRATION
NO
ENROLL IN BRIDGING
DECISION LOGIC
REMEDIAL MODULES
YES
TRADE TEST ELIGIBLE
OUTCOME
Reducing administrative backlog through Algorithmic Eligibility.
NotebookLM

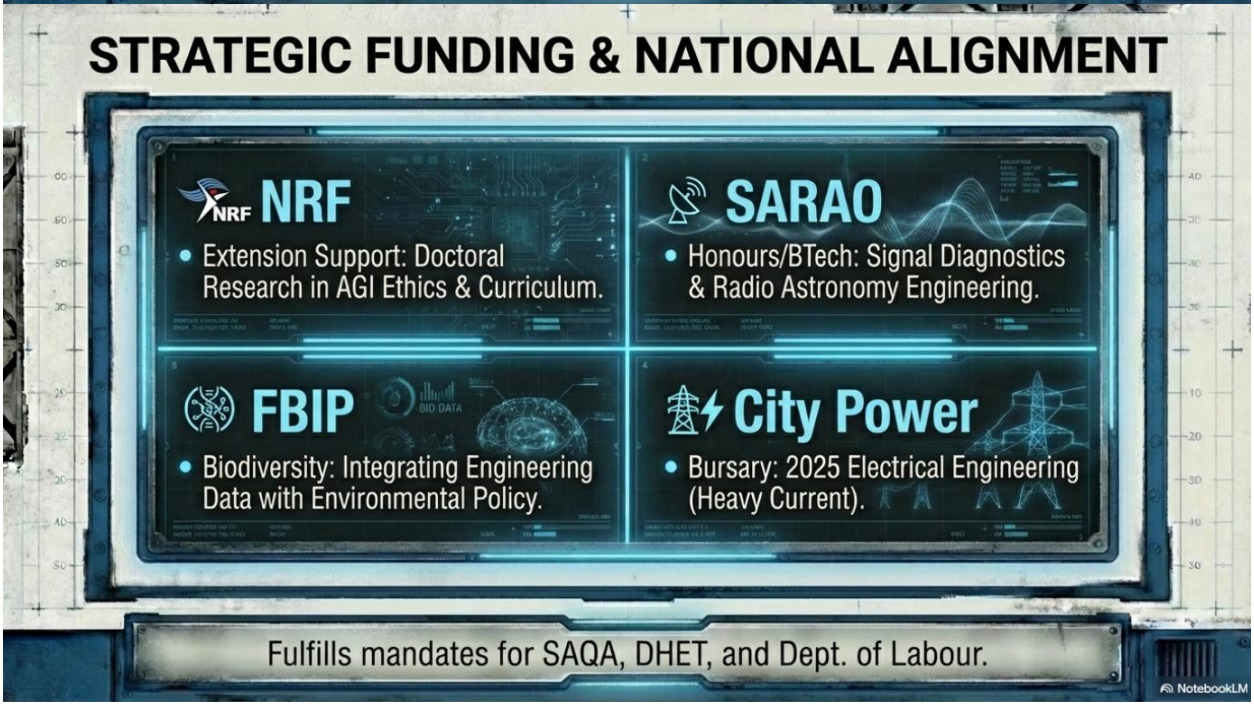
PILLAR 3: SAFETY, SECURITY & PUBLIC POLICY
PUBLIC SECURITY
• PSiRA Governance
• Warden Deployment Protocols
OCCUPATIONAL SAFETY
• LOTO Procedures
• Arc Flash Prevention
• Electric Shock Mitigation
TRAFFIC ANALYTICS
• Collision Statistics
• Incident Correlation Logic
OUTCOME: Producing Audit-Ready Safety Portfolios for Dept. of Labour Review.
NotebookLM

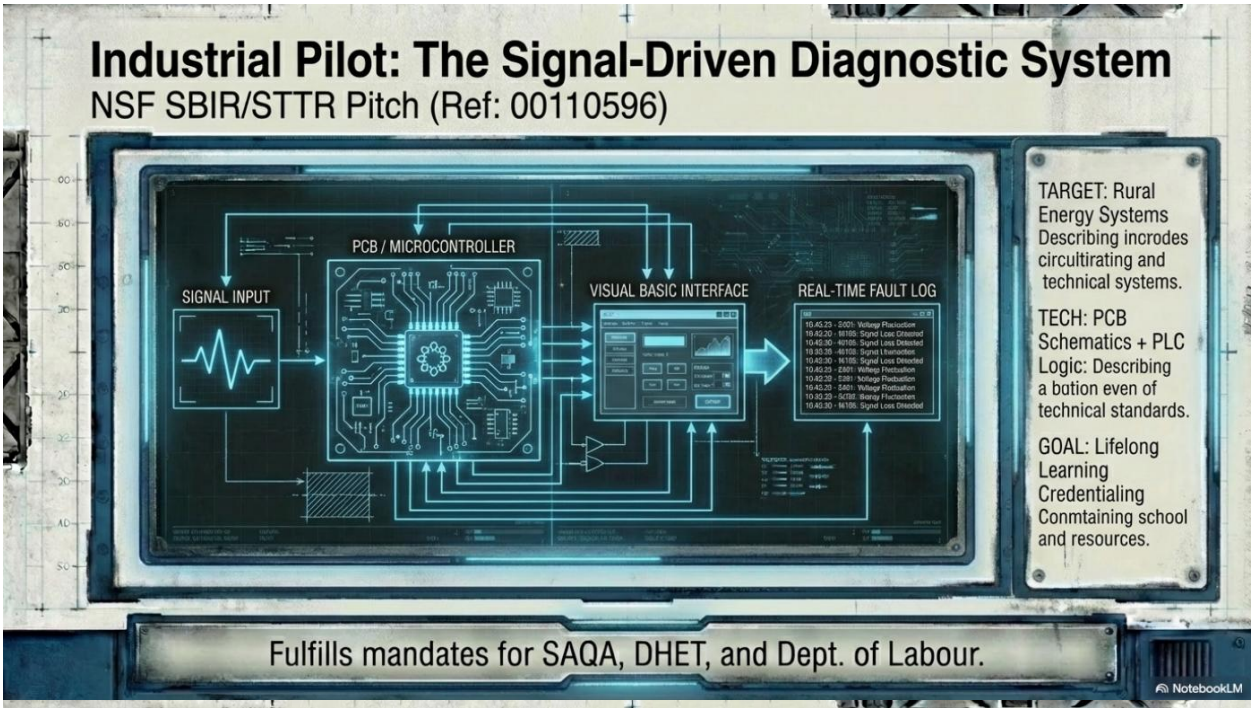

THE ENGINE: AUTOMATION VIA VISUAL BASIC (VBA)
VBA SCRIPT
Sub CredentialAuditExport()
If qualification <> "" And attendance >= 75 Then
exportStatus = "Eligible"
ElseIf levyStatus <> "Paid" Then
exportStatus = "Flag: Non-Compliant"
End If
Call ExportToArchive(studentID, exportStatus)
End Sub
DIAGRAMMATIC LOGIC
VALIDATES REGULATORY THRESHOLDS
FLAGS FINANCIAL COMPLIANCE (LABOUR LEVY)
TRIGGERS GITHUB/LMS ARCHIVAL
Transforming static spreadsheets into dynamic compliance engines.
NotebookLM

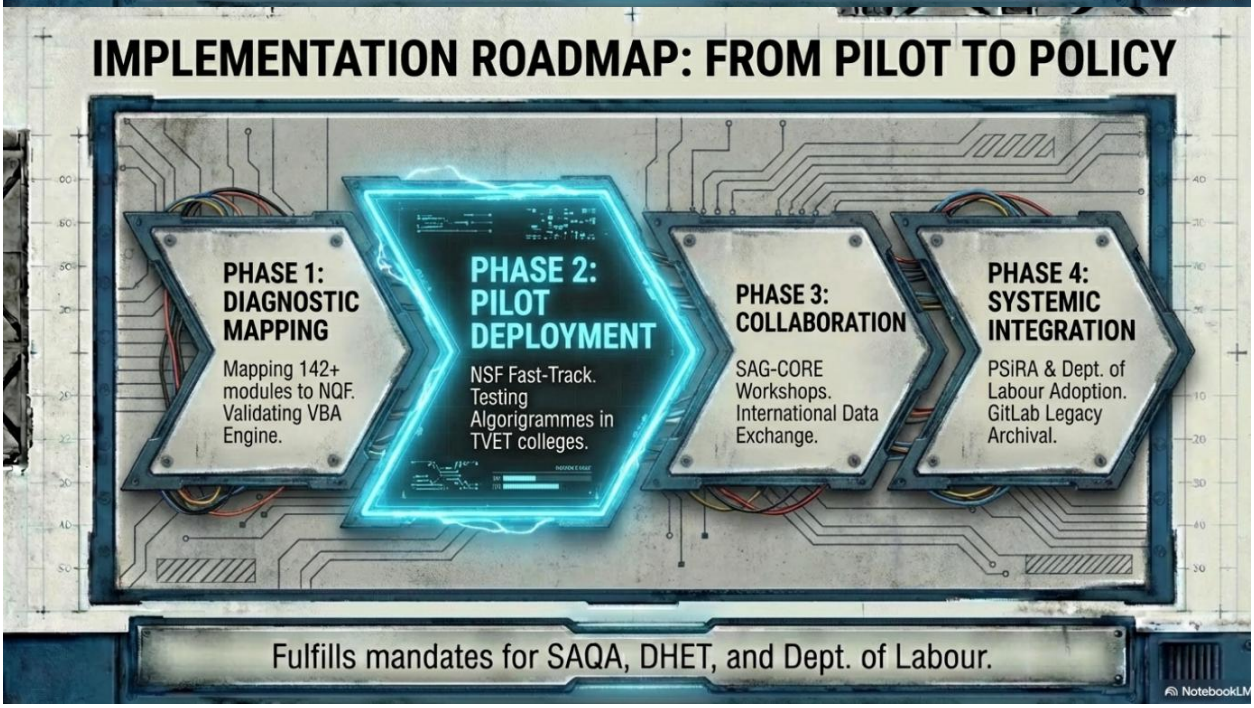
The Digital Portfolio: 142+ Verification Points
Tableaux" Heatmap
12.2 HOURS
verified Active Training
Energy:
Solar, Wind, Battery
Automation:
EcoStruxure, Robotics, Drives
Safety:
Arc Flash, Ethics, Ethics, Cybersecurity
Management:
Cash Flow, Project Mgmt
Audit-ready for SAQA / NQF mapping.
NotebookLM

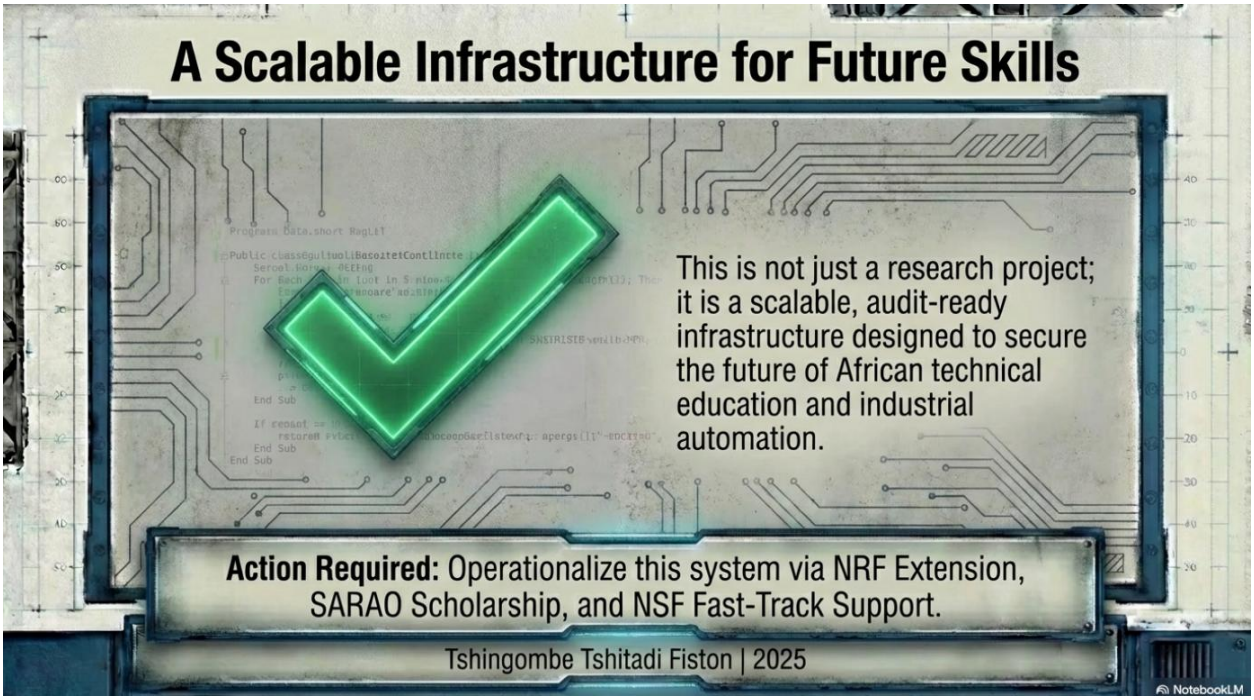

RIGOUR THROUGH ITERATION: THE RESEARCH JOURNEY
F1000Research Submissions
EARLY 2025
Phase 1: Rural Energy.
Focus on Master Education.
MID 2025
Phase 2: Curriculum Frameworks.
Evolution to Project Engineering.
CURRENT
Phase 3: Modular Framework.
Consolidated System. Accepted for NRF/NSF Applications.
F1000Research Submissions
Refining the vision through 15+ rigorous peer review cycles.
NotebookLM

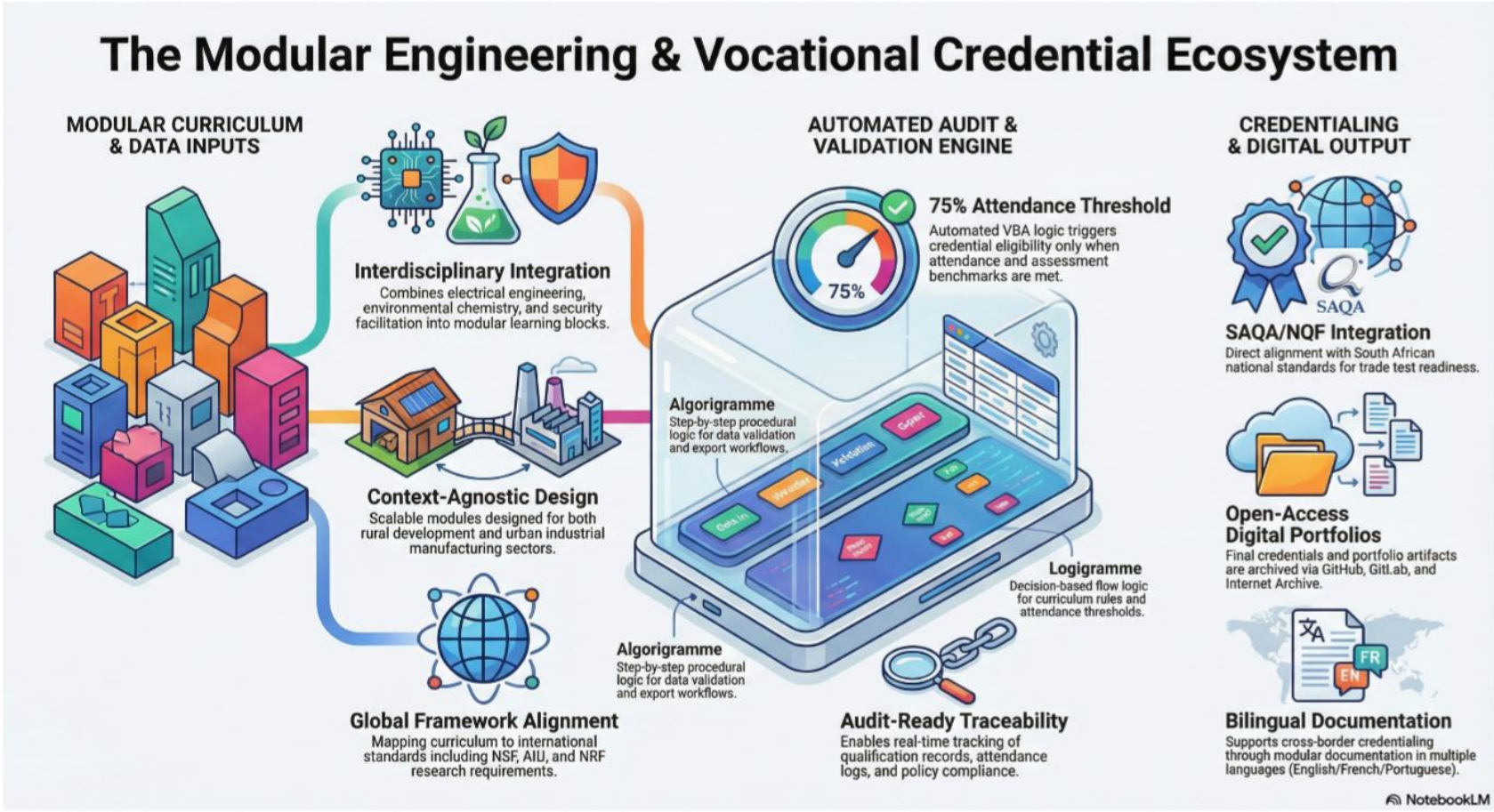

International Collaboration: SAG-CORE & NSF
SAG-CORE
(Fault Diagnostics)
NSF
(Fast-Track SBIR)
Regional
Deployment
Framework Hub
Gauteng
Bilingual Output:
EN / FR / DE / PT
Standards:
ISO / IEC Aligned
Focus:
Cross-border
Credentialing
Global network for decentralized credentialing and technical standards.
NotebookLM

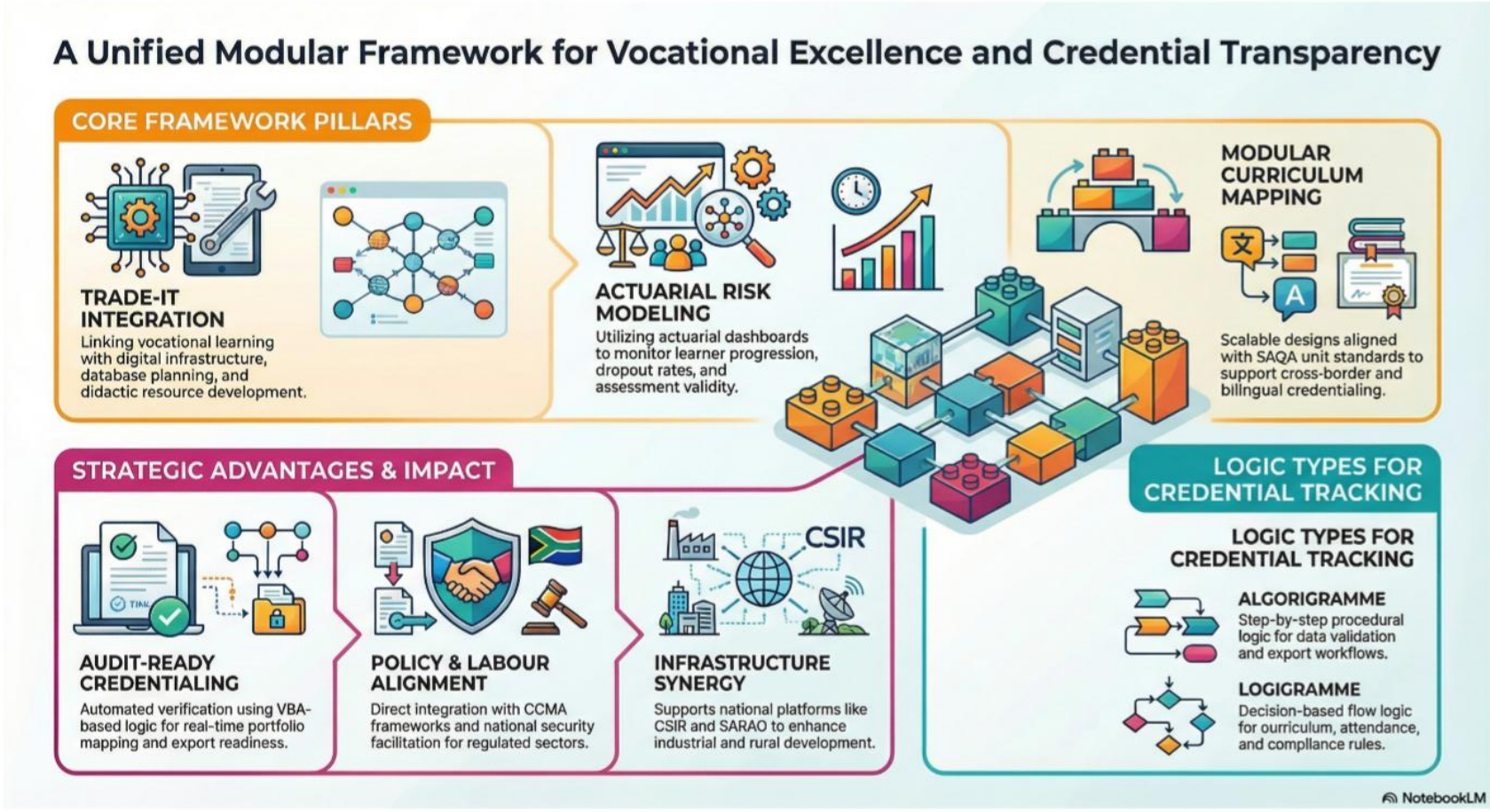

STRATEGIC FUNDING & NATIONAL ALIGNMENT
NRF
Extension Support: Doctoral Research in AGI Ethics & Curriculum.
SARAO
Honours/BTech: Signal Diagnostics & Radio Astronomy Engineering.
FBIP
BIO DATA
Biodiversity: Integrating Engineering Data with Environmental Policy.
City Power
Bursary: 2025 Electrical Engineering (Heavy Current).
Fulfills mandates for SAQA, DHET, and Dept. of Labour.
NotebookLM

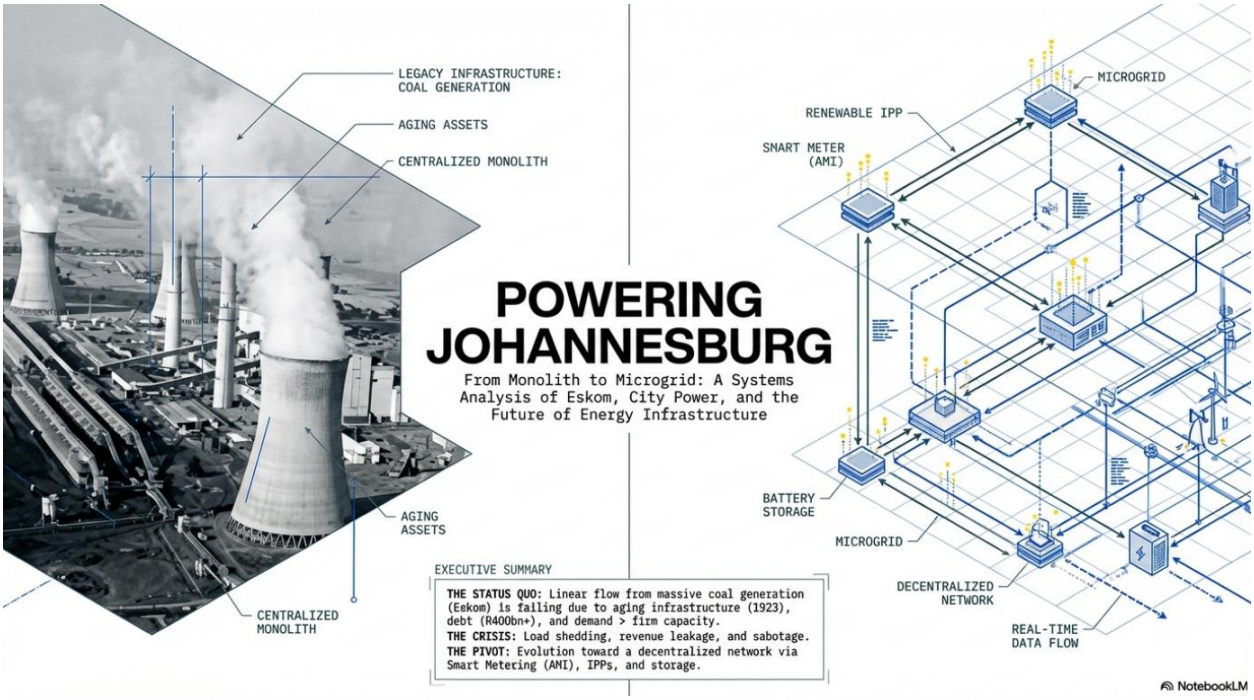

Industrial Pilot: The Signal-Driven Diagnostic System
NSF SBIR/STTR Pitch (Ref: 00110596)
SIGNAL INPUT
PCB / MICROCONTROLLER
VISUAL BASIC INTERFACE
REAL-TIME FAULT LOG
TARGET: Rural Energy Systems Describing incrodes circultirating and technical systems.
TECH: PCB Schematics + PLC Logic: Describing a bation even of technical standards.
GOAL: Lifelong Learning Credentialing Conmtaining school and resources.
Fulfills mandates for SAQA, DHET, and Dept. of Labour.
NotebookLM


IMPLEMENTATION ROADMAP: FROM PILOT TO POLICY
PHASE 1: DIAGNOSTIC MAPPING
Mapping 142+ modules to NQF. Validating VBA Engine.
PHASE 2: PILOT DEPLOYMENT
NSF Fast-Track. Testing Algorigrammes in TVET colleges.
PHASE 3: COLLABORATION
SAG-CORE Workshops. International Data Exchange.
PHASE 4: SYSTEMIC INTEGRATION
PSiRA & Dept. of Labour Adoption. GitLab Legacy Archival.
Fulfills mandates for SAQA, DHET, and Dept. of Labour.
NotebookLM

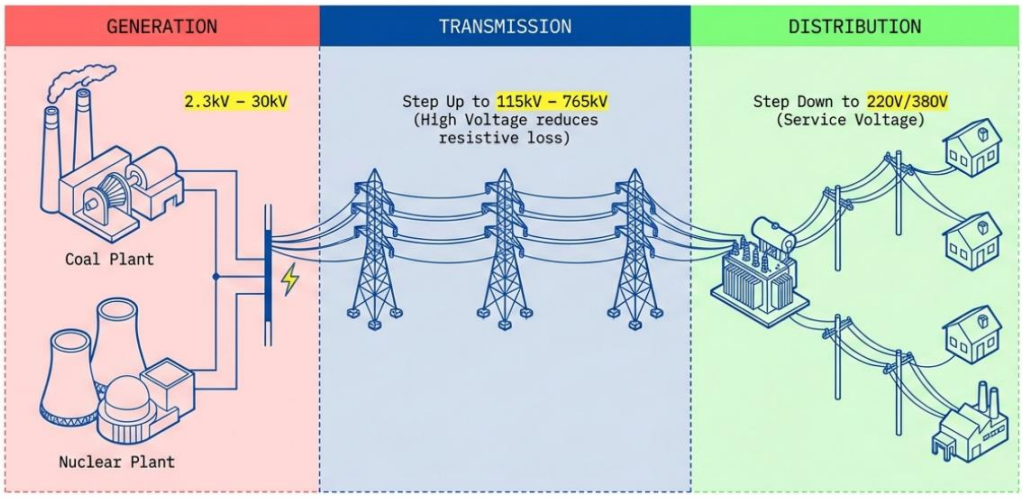

A Scalable Infrastructure for Future Skills
This is not just a research project; it is a scalable, audit-ready infrastructure designed to secure the future of African technical education and industrial automation.
Action Required: Operationalize this system via NRF Extension, SARAO Scholarship, and NSF Fast-Track Support.
Tshingombe Tshitadi Fiston | 2025
NotebookLM


The Modular Engineering & Vocational Credential Ecosystem
MODULAR CURRICULUM & DATA INPUTS
Interdisciplinary Integration
Combines electrical engineering, environmental chemistry, and security facilitation into modular learning blocks.
Context-Agnostic Design
Scalable modules designed for both rural development and urban industrial manufacturing sectors.
Global Framework Alignment
Mapping curriculum to international standards including NSF, AIU, and NRF research requirements.
AUTOMATED AUDIT & VALIDATION ENGINE
75%
75% Attendance Threshold
Automated VBA logic triggers credential eligibility only when attendance and assessment benchmarks are met.
Algorigramme
Step-by-step procedural logic for data validation and export workflows.
Logigramme
Decision-based flow logic for curriculum rules and attendance thresholds.
Algorigramme
Step-by-step procedural logic for data validation and export workflows.
Audit-Ready Traceability
Enables real-time tracking of qualification records, attendance logs, and policy compliance.
CREDENTIALING & DIGITAL OUTPUT
SAQA
SAQA/NQF Integration
Direct alignment with South African national standards for trade test readiness.
Open-Access Digital Portfolios
Final credentials and portfolio artifacts are archived via GitHub, GitLab, and Internet Archive.
FR
EN
Bilingual Documentation
Supports cross-border credentialing through modular documentation in multiple languages (English/French/Portuguese).
NotebookLM


A Unified Modular Framework for Vocational Excellence and Credential Transparency
CORE FRAMEWORK PILLARS
TRADE-IT INTEGRATION
Linking vocational learning with digital infrastructure, database planning, and didactic resource development.
ACTUARIAL RISK MODELING
Utilizing actuarial dashboards to monitor learner progression, dropout rates, and assessment validity.
MODULAR CURRICULUM MAPPING
Scalable designs aligned with SAQA unit standards to support cross-border and bilingual credentialing.
STRATEGIC ADVANTAGES & IMPACT
AUDIT-READY CREDENTIALING
Automated verification using VBA-based logic for real-time portfolio mapping and export readiness.
POLICY & LABOUR ALIGNMENT
Direct integration with CCMA frameworks and national security facilitation for regulated sectors.
CSIR
INFRASTRUCTURE SYNERGY
Supports national platforms like CSIR and SARAO to enhance industrial and rural development.
LOGIC TYPES FOR CREDENTIAL TRACKING
LOGIC TYPES FOR CREDENTIAL TRACKING
ALGORIGRAMME
Step-by-step procedural logic for data validation and export workflows.
LOGIGRAMME
Decision-based flow logic for curriculum, attendance, and compliance rules.
NotebookLM



THE LINEAR ARCHITECTURE OF THE GRID



PHYSICS NOTE: Doubling voltage reduces current by half, cutting resistive losses by 75%. 75%. This dictates the massive scale of transmission infrastructure.

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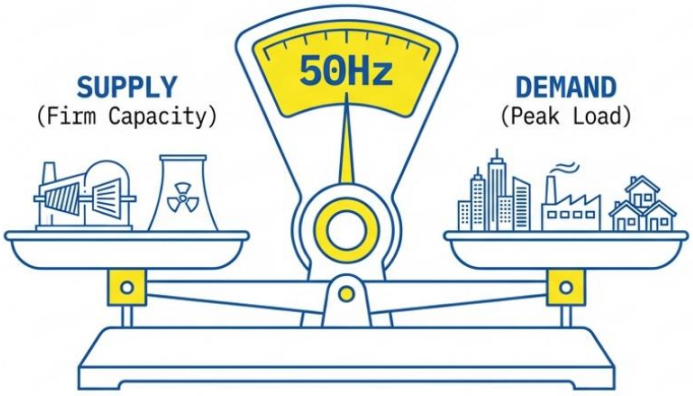
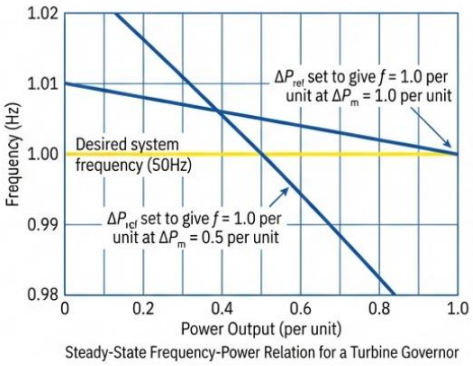
THE PHYSICS OF STABILITY: 50HZ





Steady-State Frequency-Power Relation for a Turbine Governor

SYNCHRONOUS GRID:
All generators spin in lockstep. Inertia from turbines buffers small changes.

FAILURE MODE:
If Demand > Supply, turbines slow down. Frequency drops. Below 49.9Hz, equipment trips to prevent damage.

IMPLICATION:
Load Shedding is a physical necessity to preserve the 50Hz heartbeat.

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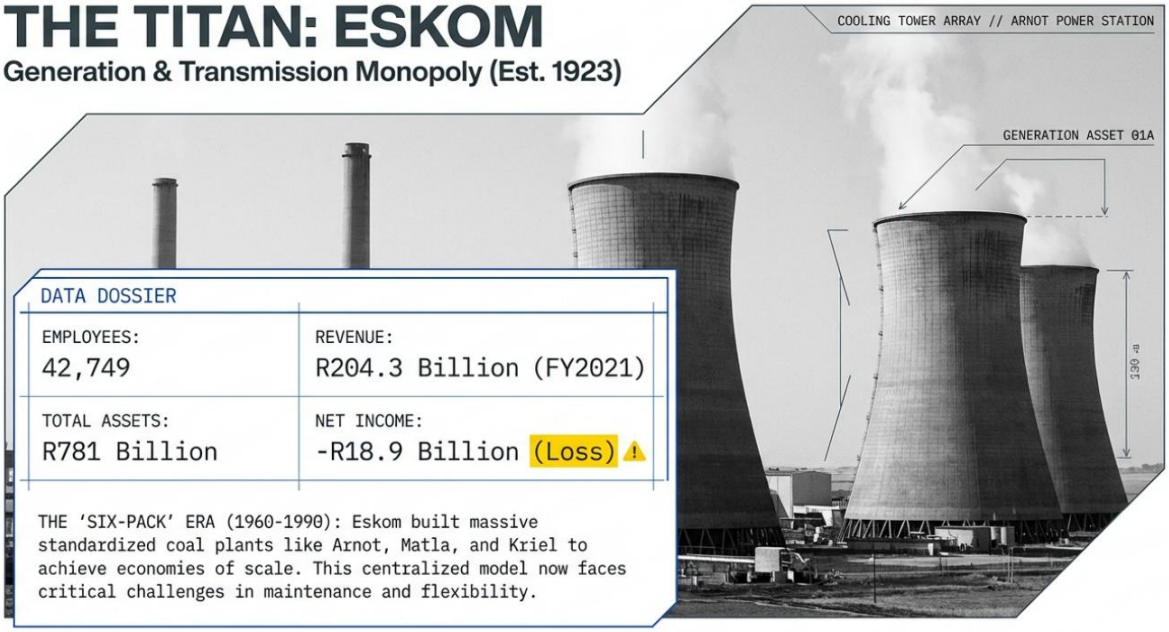
THE TITAN: ESKOM

Generation & Transmission Monopoly (Est. 1923)



DATA DOSSIER

EMPLOYEES: 42,749	REVENUE: R204.3 Billion (FY2021)
TOTAL ASSETS: R781 Billion	NET INCOME: -R18.9 Billion (Loss) ⚠

THE 'SIX-PACK' ERA (1960-1990): Eskom built massive standardized coal plants like Arnot, Matla, and Kriel to achieve economies of scale. This centralized model now faces critical challenges in maintenance and flexibility.

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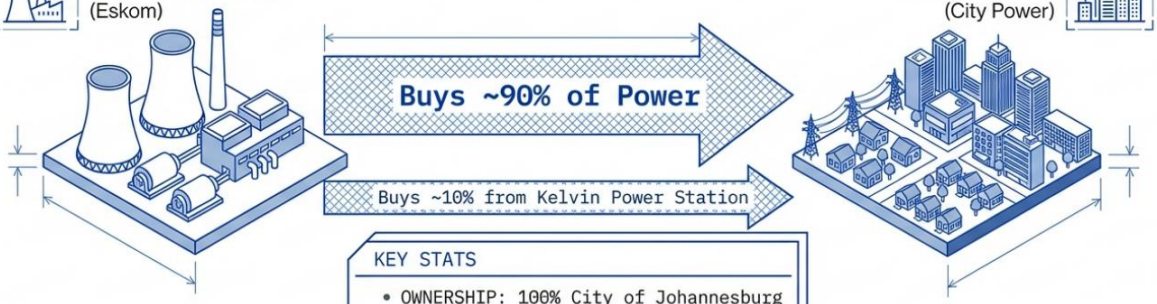
THE DISTRIBUTOR: CITY POWER JOHANNESBURG

The 'Last Mile' Retailer

WHOLESALER
(Eskom)

RETAILER
(City Power)



KEY STATS

- OWNERSHIP: 100% City of Johannesburg
- CUSTOMERS: 3.2 Million People
- REVENUE: R17 Billion
- ASSETS: R19.7 Billion
- EMPLOYEES: 1,750

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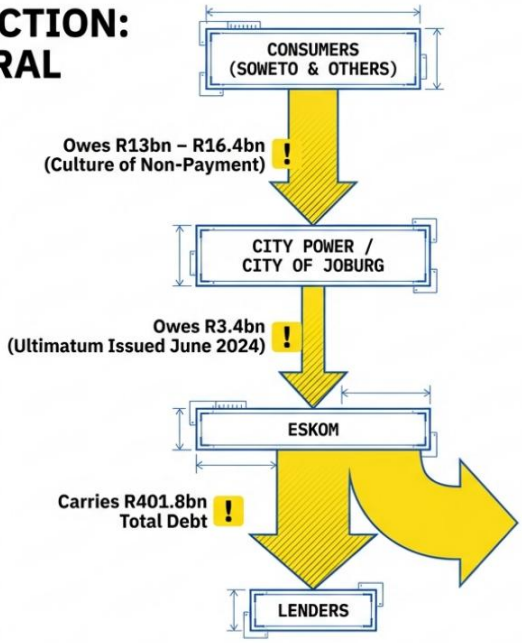
SYSTEMIC FRICTION: THE DEBT SPIRAL


CONSUMERS (SOWETO & OTHERS)
Owes R13bn – R16.4bn (Culture of Non-Payment)
CITY POWER / CITY OF JOBURG
Owes R3.4bn (Ultimatum Issued June 2024)
ESKOM
Carries R401.8bn Total Debt
LENDERS

THE UTILITY DEATH SPIRAL:

Lack of revenue
→
Deferred Maintenance
→
Lower Availability
→
Less Revenue
→
Reliance on Govt Bailouts (R254bn support).

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LOAD SHEDDING VS. BLACKOUT

LOAD SHEDDING

- **Definition:** Intentional, controlled shutdown of grid sections.
- **Purpose:** To reduce load when Demand > Supply.
- **Current Reality:** Stage 6 (Dec 2019) removed 2000MW from grid.

BLACKOUT

- **Definition:** Uncontrolled, total loss of power (Grid Trip).
- **Consequence:** Requires 'Black Start' procedures (days/weeks to recover).
- **Risk Factor:** High, due to aging coal fleet and lack of reserve margin.

City Power Goal: Cut load shedding by 3 stages via smart meters and gas turbines.

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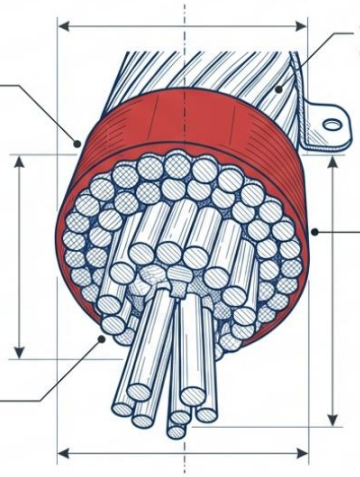
NON-TECHNICAL LOSSES: THEFT & SABOTAGE

CABLE THEFT

Destabilizes network frequency and causes outages.

SABOTAGE

Deliberate severing of steel supports (Lethabo pylon collapse) and corruption in fuel oil supply.



VANDALISM

Cost City Power R200 million (80% of budget) to replace 390 mini-substations.

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REVENUE RECUPERATION STRATEGIES

Aggressive Disconnection & Debt Collection

Target List

TARGET	DEBT OWED
GAUTENG GOVT TREASURY	R34 Million Owed
APARTHEID MUSEUM	R1.8 Million Owed
NIGERIAN CONSULATE	R406,000 Owed
LENASIA SDC (Area)	R1.3 Billion Owed

TACTICS:

- **Disconnection Drives:** Physical cut-offs of non-paying entities.
- **Prepaid Deductions:** Automatically subtracting municipal debt from electricity purchases.
- **Tariff Hikes:** R230/month service charge + 23.15% tariff increase (6-12x inflation).

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THE SMART METER REVOLUTION (AMI)

AMI SYSTEM SPECIFICATIONS

TECH:	Advanced Metering Infrastructure (AMI)
PROTOCOLS:	DLMS/COSEM, Power Line Communication (PLC)
CAPABILITIES:	Two-way communication, Real-time data, Remote Disconnect, Fraud Detection.

CRITICAL DEADLINE: TID ROLLOVER

All meters must be replaced/updated by Nov 24, 2024. Old Standard Transfer Specification (STS) tokens will fail after this date.

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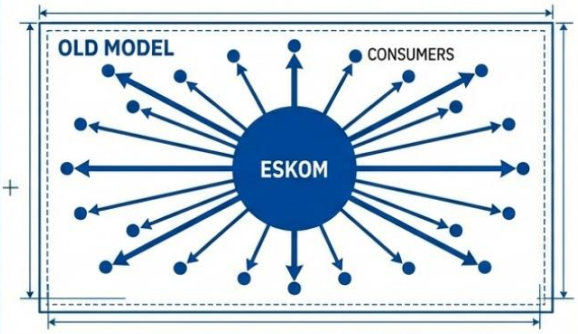
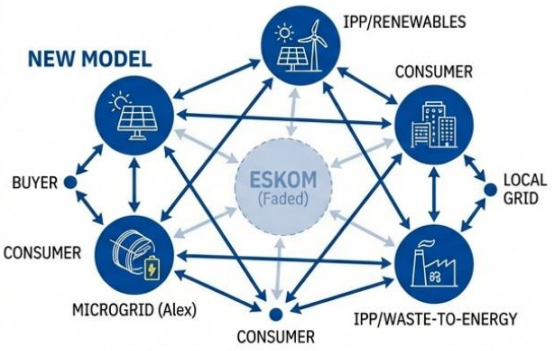
DECENTRALIZATION

Microgrids & Wheeling



Centralized generation and distribution. Unidirectional power flow from a single source to end-users.



Decentralized, distributed generation and storage. Multidirectional power flow. Peer-to-peer and grid-tied interactions.

MICROGRIDS: Deployment in Alexandra and informal settlements to bypass main grid instability. Enhances local energy security.

WHEELING (July 2023): Framework allowing IPPs to generate power at Location A and 'wheel' it through the grid to Buyer at Location B, paying City Power for infrastructure use.

IPP PROCUREMENT: 92MW secured from waste-to-energy, gas, and solar sources. Diversifies energy mix and increases capacity.

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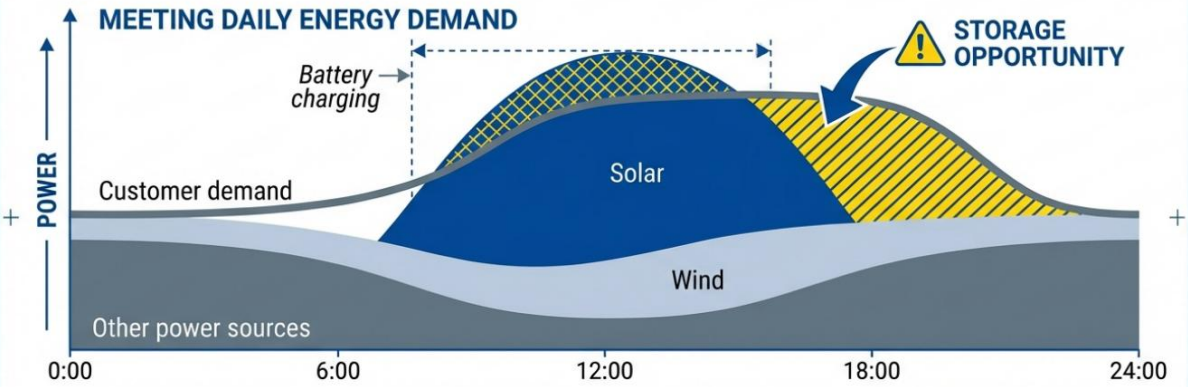
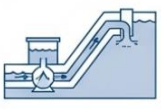
STORAGE & STABILITY: SOLVING INTERMITTENCY





1. PUMPED HYDRO: The 'Water Battery'. Pumping water uphill during low demand; releasing for peak. (e.g., Drakensberg, Ingula).

2. BESS: Battery Energy Storage Systems (Lithium-ion) for rapid frequency response.

3. THERMAL: Molten salts or Carnot batteries for long-duration storage.

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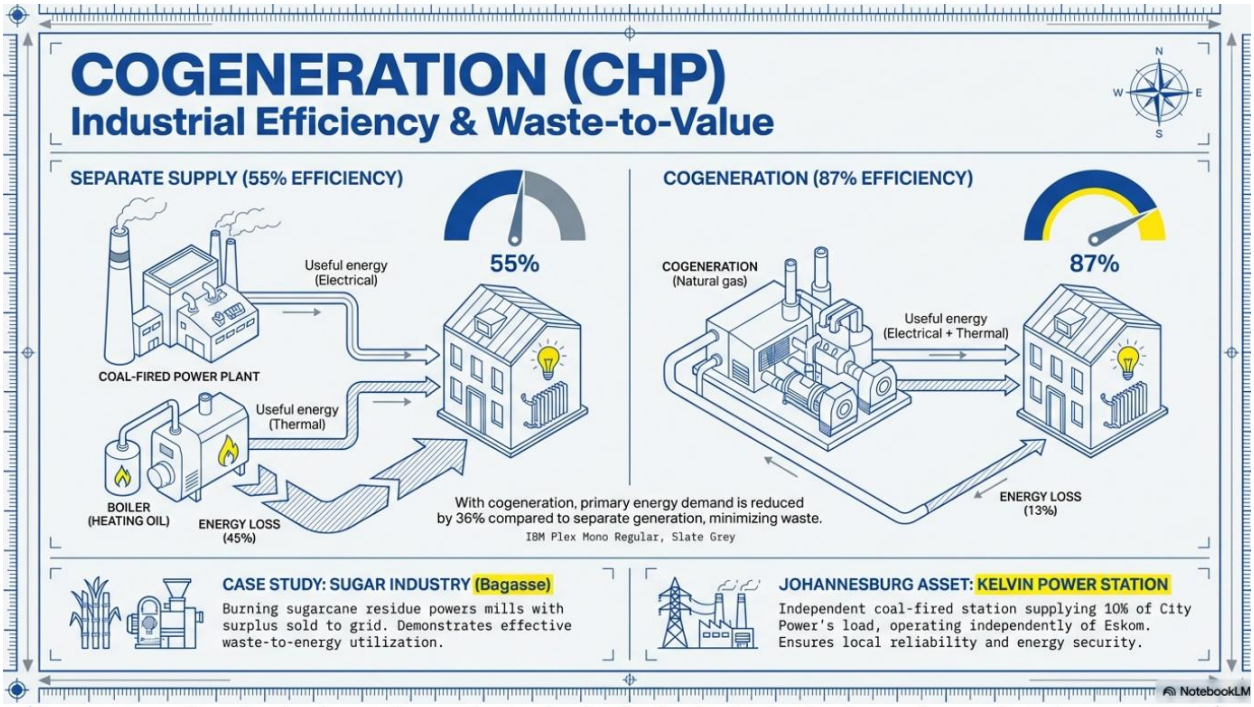
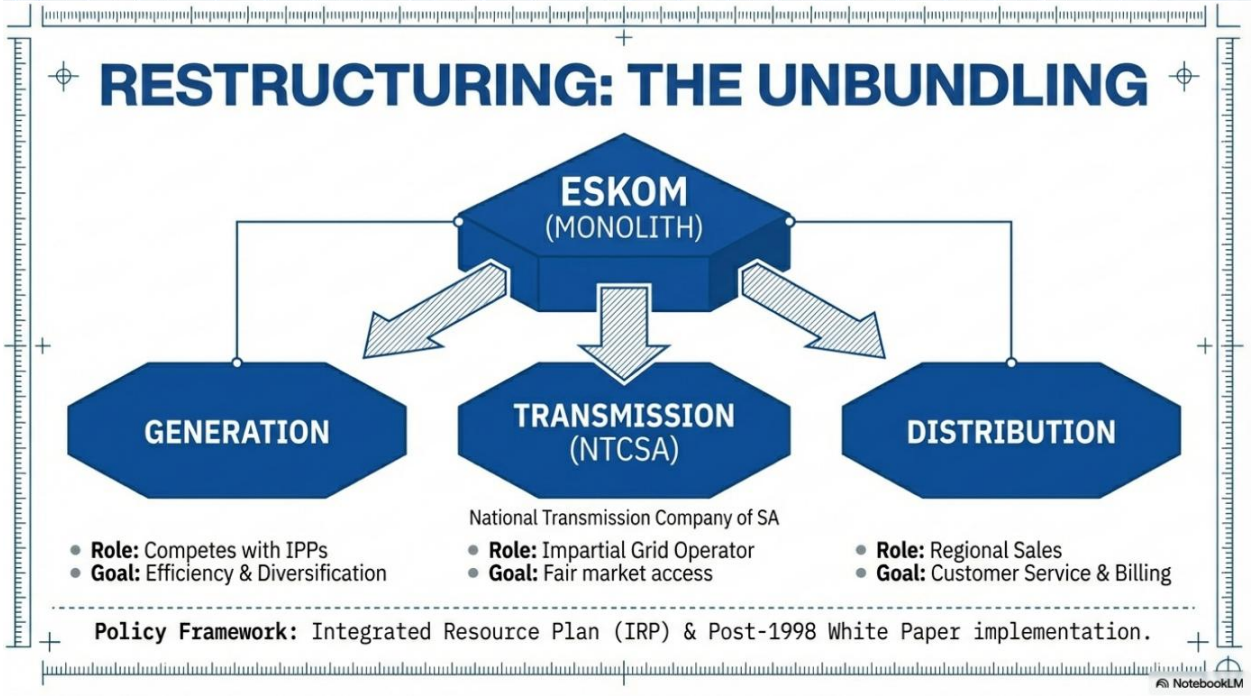
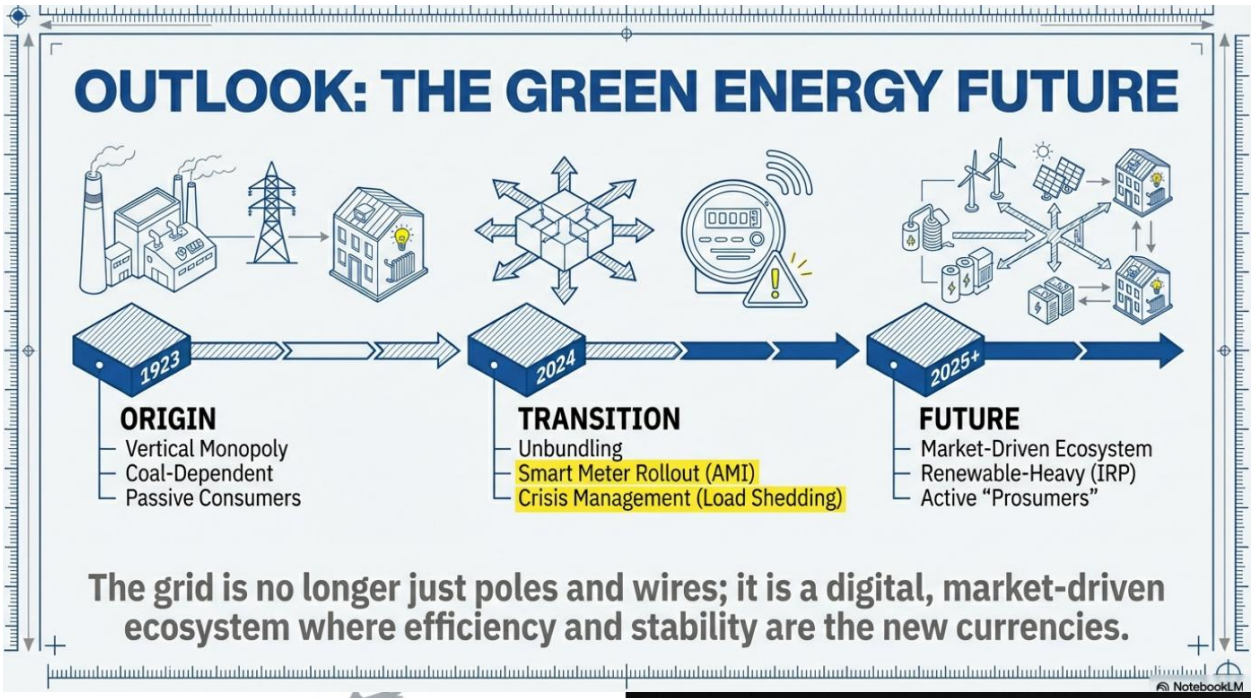
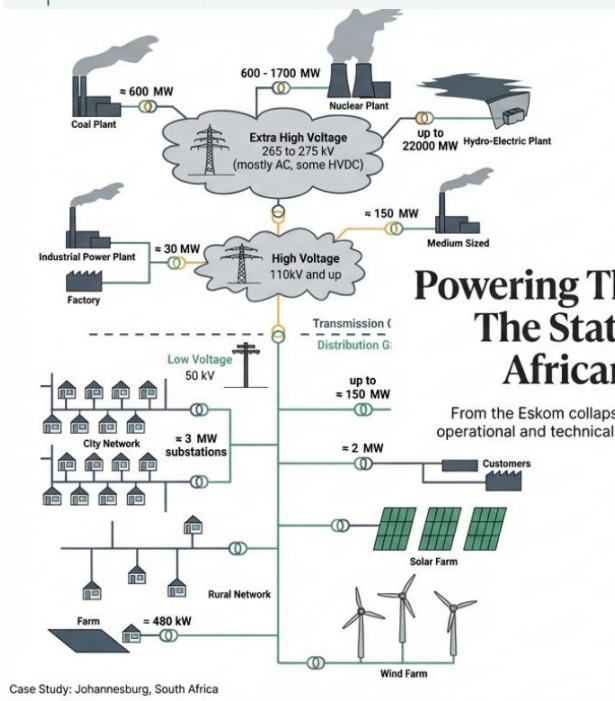

COGENERATION (CHP)
Industrial Efficiency & Waste-to-Value
SEPARATE SUPPLY (55% EFFICIENCY)
55%
Useful energy (Electrical)
COAL-FIRED POWER PLANT
Useful energy (Thermal)
BOILER (HEATING OIL)
ENERGY LOSS (45%)
COGENERATION (87% EFFICIENCY)
87%
COGENERATION (Natural gas)
Useful energy (Electrical + Thermal)
ENERGY LOSS (13%)
With cogeneration, primary energy demand is reduced by 36% compared to separate generation, minimizing waste.
IBM Plex Mono Regular, Slate Grey
CASE STUDY: SUGAR INDUSTRY (Bagasse)
Burning sugarcane residue powers mills with surplus sold to grid. Demonstrates effective waste-to-energy utilization.
JOHANNESBURG ASSET: KELVIN POWER STATION
Independent coal-fired station supplying 10% of City Power's load, operating independently of Eskom. Ensures local reliability and energy security.
NotebookLM


RESTRUCTURING: THE UNBUNDLING
ESKOM (MONOLITH)
GENERATION
TRANSMISSION (NTCSA)
DISTRIBUTION
National Transmission Company of SA
Role: Competes with IPPs
Goal: Efficiency & Diversification
Role: Impartial Grid Operator
Goal: Fair market access
Role: Regional Sales
Goal: Customer Service & Billing
Policy Framework: Integrated Resource Plan (IRP) & Post-1998 White Paper implementation.
NotebookLM

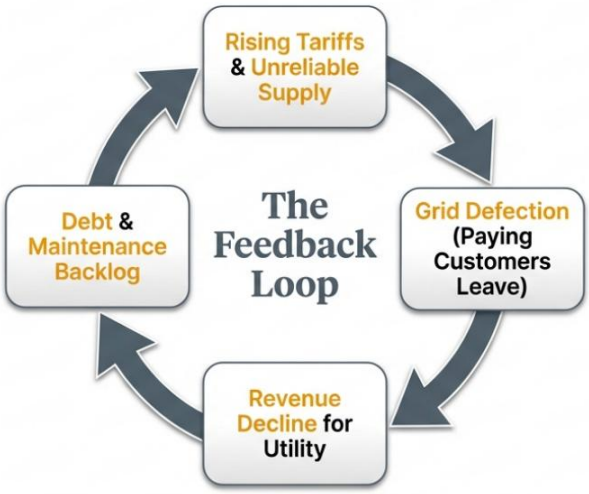

OUTLOOK: THE GREEN ENERGY FUTURE
1923
ORIGIN
Vertical Monopoly
Coal-Dependent
Passive Consumers
2024
TRANSITION
Unbundling
Smart Meter Rollout (AMI)
Crisis Management (Load Shedding)
2025+
FUTURE
Market-Driven Ecosystem
Renewable-Heavy (IRP)
Active "Prosumers"
The grid is no longer just poles and wires; it is a digital, market-driven ecosystem where efficiency and stability are the new currencies.
NotebookLM


≈ 600 MW
Coal Plant
600 - 1700 MW
Nuclear Plant
Extra High Voltage
265 to 275 kV
(mostly AC, some HVDC)
up to
22000 MW
Hydro-Electric Plant
≈ 150 MW
Medium Sized
≈ 30 MW
Industrial Power Plant
Factory
High Voltage
110kV and up
Low Voltage
50 kV
up to
≈ 150 MW
City Network
≈ 3 MW
substations
≈ 2 MW
Customers
Solar Farm
Rural Network
Farm
≈ 480 kW
Wind Farm
Case Study: Johannesburg, South Africa

Powering Through Crisis: The State of South African Energy
From the Eskom collapse to the City Power pivot: An operational and technical analysis of a grid under stress.
NotebookLM

The Utility Death Spiral

The Situation: Eskom (National Monopoly)
- Est. 1923
- Aging Infrastructure
- R400bn+ Debt Burden


Rising Tariffs & Unreliable Supply
Grid Defection (Paying Customers Leave)
Revenue Decline for Utility
Debt & Maintenance Backlog
The Feedback Loop

The Complication: City Power (Municipal Distributor)
- Buys 90% power from Eskom
- Serves 3.2m residents
- Faces revenue collection crisis

The Pivot: Aggressive revenue protection, smart metering (AMI), and decoupling via IPPs.

NotebookLM

The National Giant: Eskom's Rise and Stumble

1960s-1980s: The "Six-Pack" Era
Rapid expansion of standardized coal-fired plants to achieve economies of scale. Capacity reached 40,000 MW.

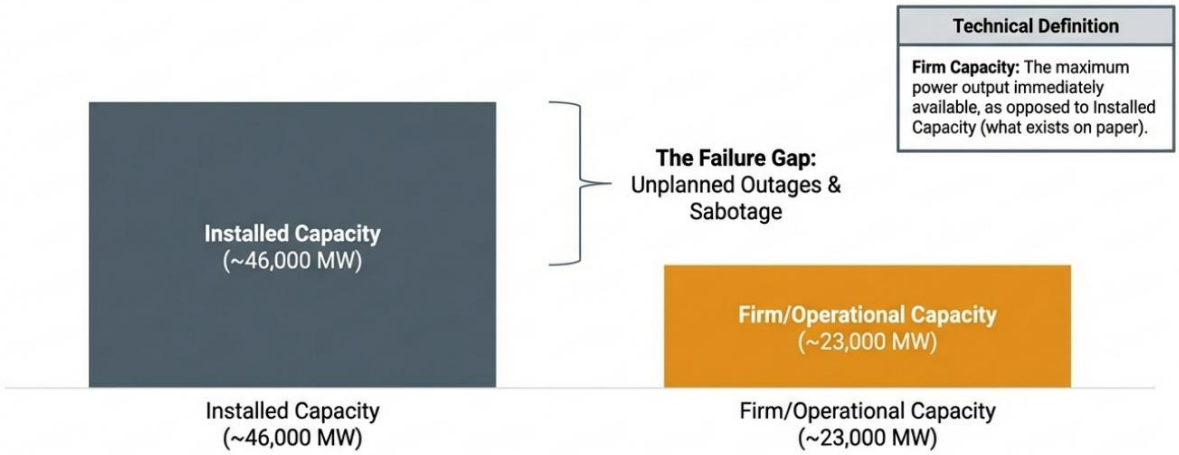
1994-2007: Electrification vs. Capacity
Focus shifted to connecting residential homes. Budget requests for new generation were denied by the state.

2007-Present: The Crisis Era
Demand exceeded supply. Load shedding introduced in 2008. Medupi and Kusile plants delayed and over-budget.

Current Status: Stage 6 Load Shedding
(Removing 6000MW from the grid).

NotebookLM

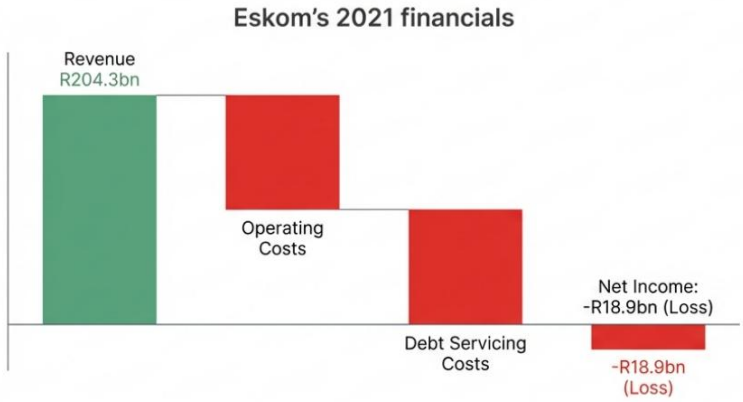
Anatomy of Failure: Why 40,000 MW Isn't Enough



- **Aging Fleet:** Breakdowns in 40+ year old plants.
- **Sabotage:** November 2021, steel supports for a coal conveyor at Lethabo were severed.
- **Corruption:** Theft of fuel oil and intentional cable cutting.

NotebookLM

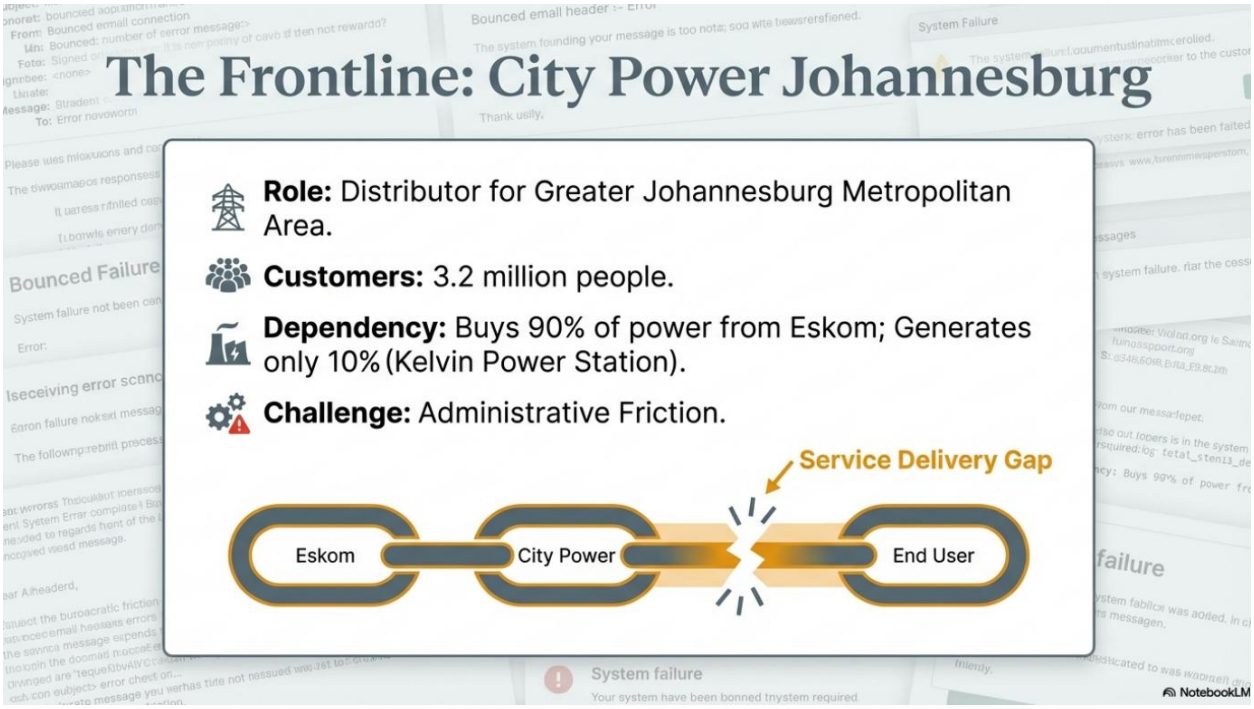
The Fi: The Financial Black Hole

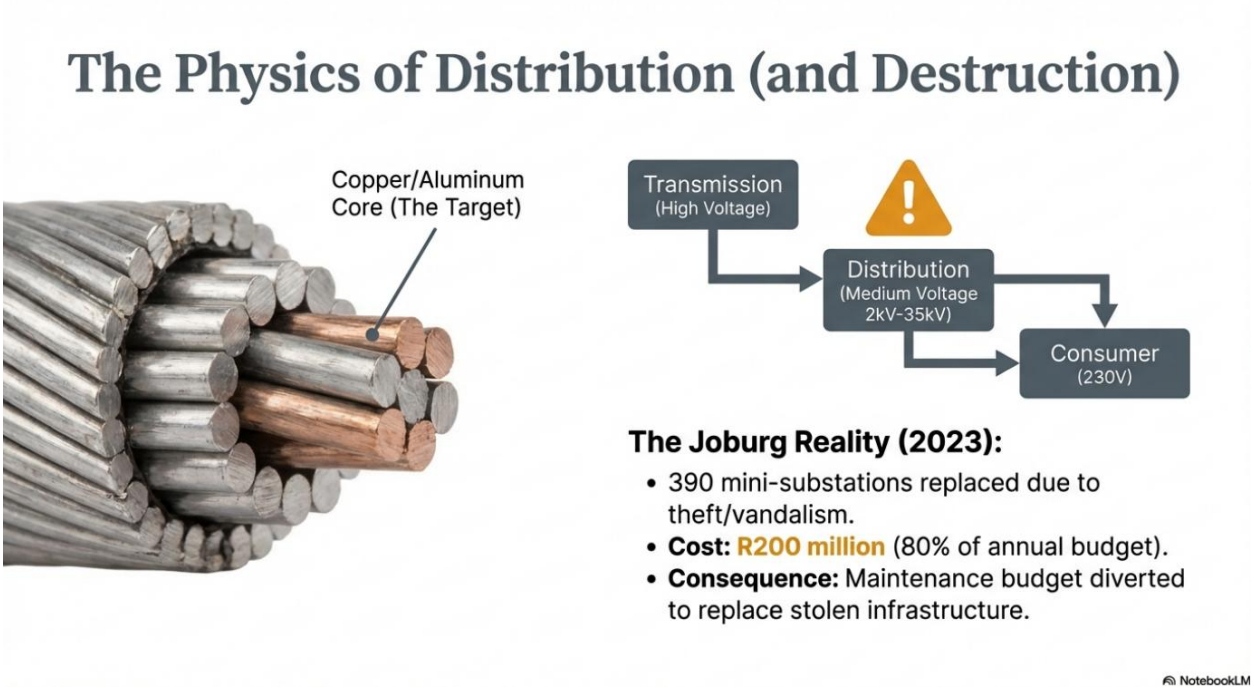


Total Debt: R401.8 Billion

Insight: Operational profit is eclipsed by debt service costs. The R254bn government bailout is a stop-gap measure, not a cure for technical insolvency.

NotebookLM

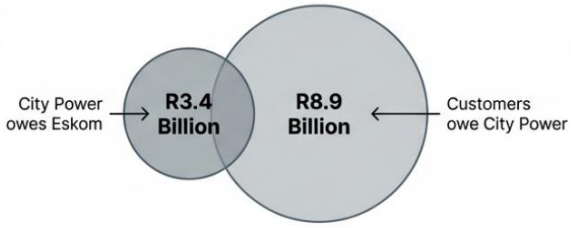

The Frontline: City Power Johannesburg
Role: Distributor for Greater Johannesburg Metropolitan Area.
Customers: 3.2 million people.
Dependency: Buys 90% of power from Eskom; Generates only 10% (Kelvin Power Station).
Challenge: Administrative Friction.
Service Delivery Gap
Eskom
City Power
End User
NotebookLM


The Physics of Distribution (and Destruction)
Copper/Aluminum Core (The Target)
Transmission (High Voltage)
Distribution (Medium Voltage 2kV-35kV)
Consumer (230V)
The Joburg Reality (2023):
390 mini-substations replaced due to theft/vandalism.
Cost: R200 million (80% of annual budget).
Consequence: Maintenance budget diverted to replace stolen infrastructure.
NotebookLM

Revenue Protection: The Fight for Solvency

The Debt Burden

- City Power owes Eskom: **R3.4 Billion**
- Customers owe City Power: **R8.9 Billion**

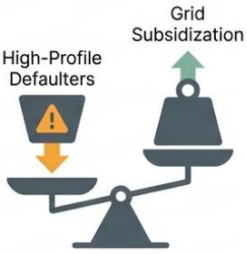


The "Robin Hood" Inversion

Disconnection drives targeting high-profile defaulters to subsidize the grid.

Targeted Defaulters:

- **Government**: Gauteng Treasury (owed **R34m**), Hospitals (**R32m** combined)
- **Diplomatic**: Nigerian Consulate (owed **R406k**)
- **Cultural**: Apartheid Museum (owed **R1.8m**)
- **Commercial**: Shopping Centers with illegal connections



Strategy: Aggressive disconnection is existential, not punitive.

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The Digital Pivot: Advanced Metering Infrastructure (AMI)

Smart Grid Capabilities

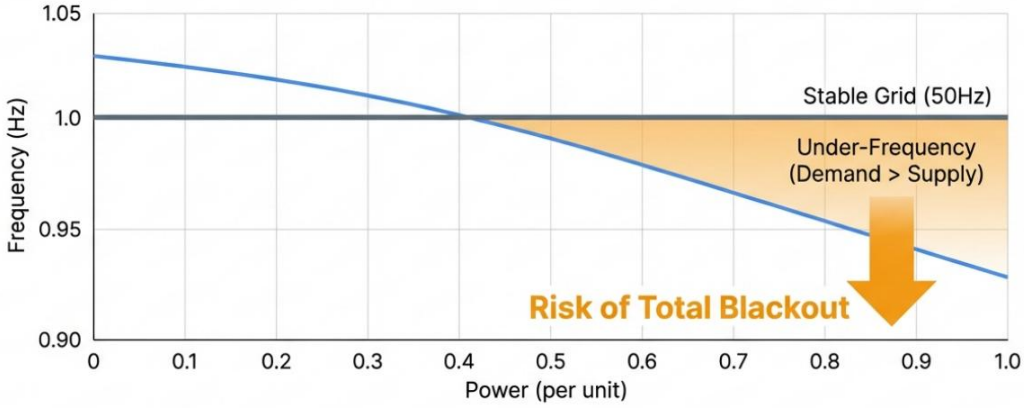
1. **Two-Way Communication:** Remote reading and fraud detection.
2. **Demand Response:** Ability to remotely limit usage during load shedding rather than cutting power entirely.
3. **Revenue Assurance:** Instant switch to prepaid tariffs for defaulters.

Critical Deadline: Token ID Update requires replacement of all meters by November 2024.

NotebookLM

The Heartbeat of the Grid: Synchronization & Frequency

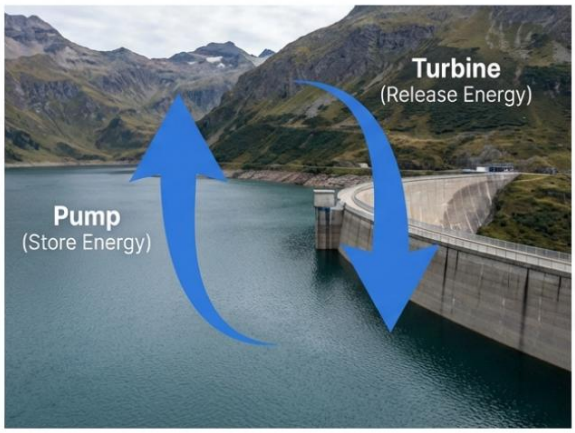
Synchronous Grid: All generators must spin at exactly 50Hz.



Load Shedding is a manual mechanism to reduce Demand so that it matches Supply, preserving the 50Hz frequency. Without it, the grid collapses.

NotebookLM

The Storage Revolution: Solving Intermittency



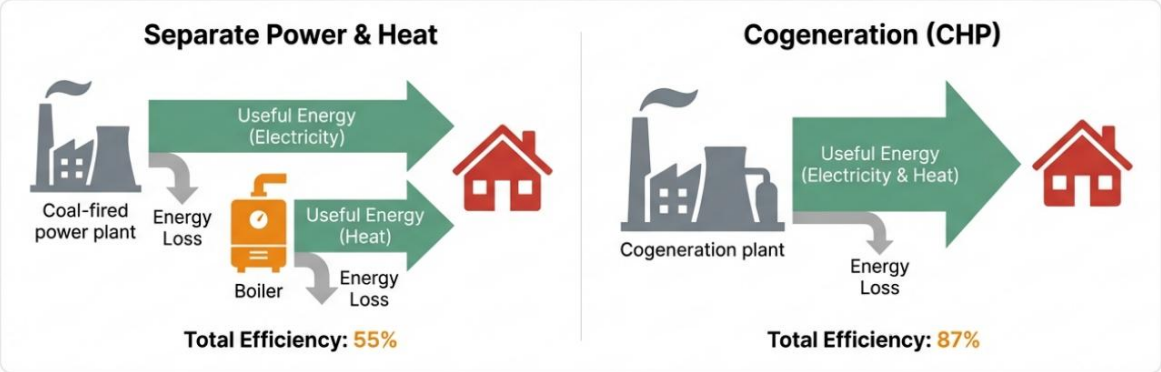
Challenge: Renewable energy (Solar/Wind) is not "**Firm Power**".

Solution: Arbitrage.

- **Concept:** Store energy when cheap/abundant, release when expensive/scarce.
- **Technologies:** Pumped Hydro (Drakensberg/Ingula) and Battery Energy Storage Systems (BESS).

NotebookLM

Heldane Display
Decentralization: Microgrids and Cogeneration



- **Microgrids:** Solar PV installations in Joburg communities capable of 'islanding' from the main grid.
- **Industrial Cogen:** Sugar sector using sugarcane bagasse to generate steam and electricity.

NotebookLM

The Renewable Transition: IRP and IPPs

City Power Independent Power Producer (IPP) Procurement (92MW)

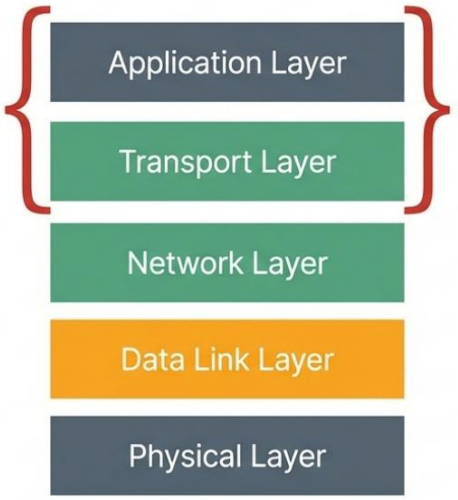
Supported by the $11 Billion Just Energy Transition partnership to fund the shift from coal.

NotebookLM

New Vulnerabilities: Cyber Risks & Social Friction

Cyber Security Risks

- Digitizing the grid exposes it to hacking.
- **Threat:** Remote disconnects or grid overloading.
- **Defense:** AES-128 Encryption (DLMS/COSEM protocols).



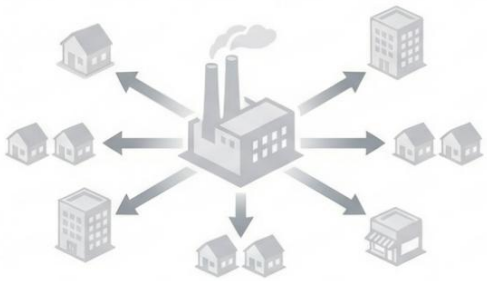
Social Friction

- **Privacy:** Smart meters reveal granular user behavior.
- **Resistance:** Public fears regarding radiation and control.

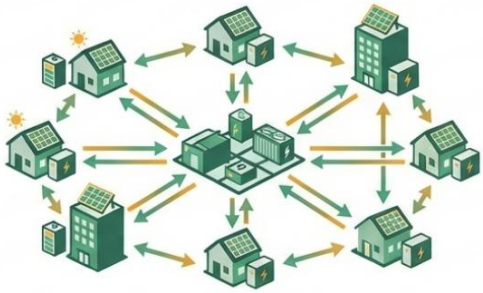
NotebookLM

The Future: From Monologue to Dialogue

The Old Grid (Monologue)



The New Grid (Dialogue)



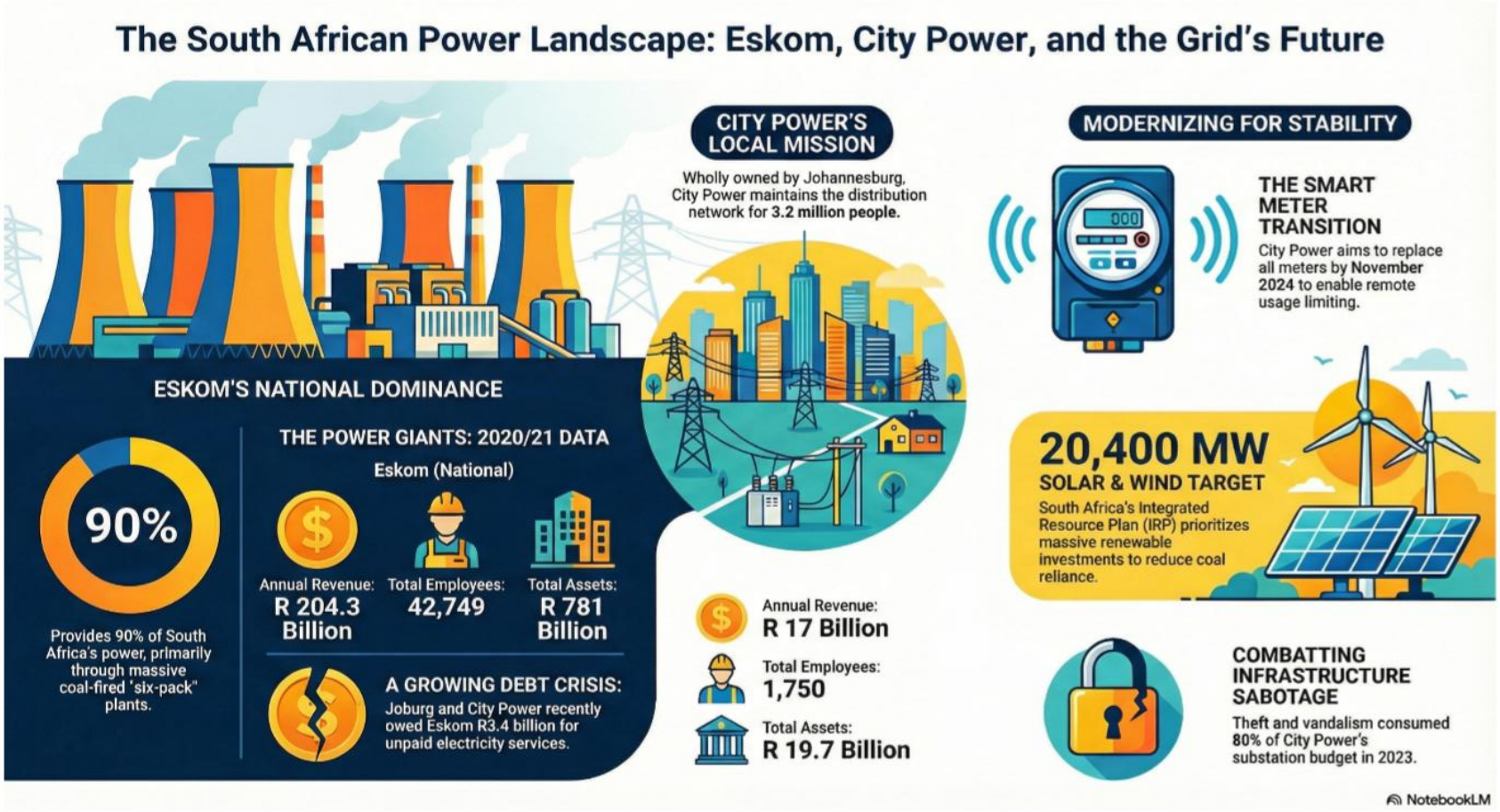
Wheeling Tariffs
Private generators "renting" the grid to move power.

Prosumers
Citizens acting as both producers and consumers.

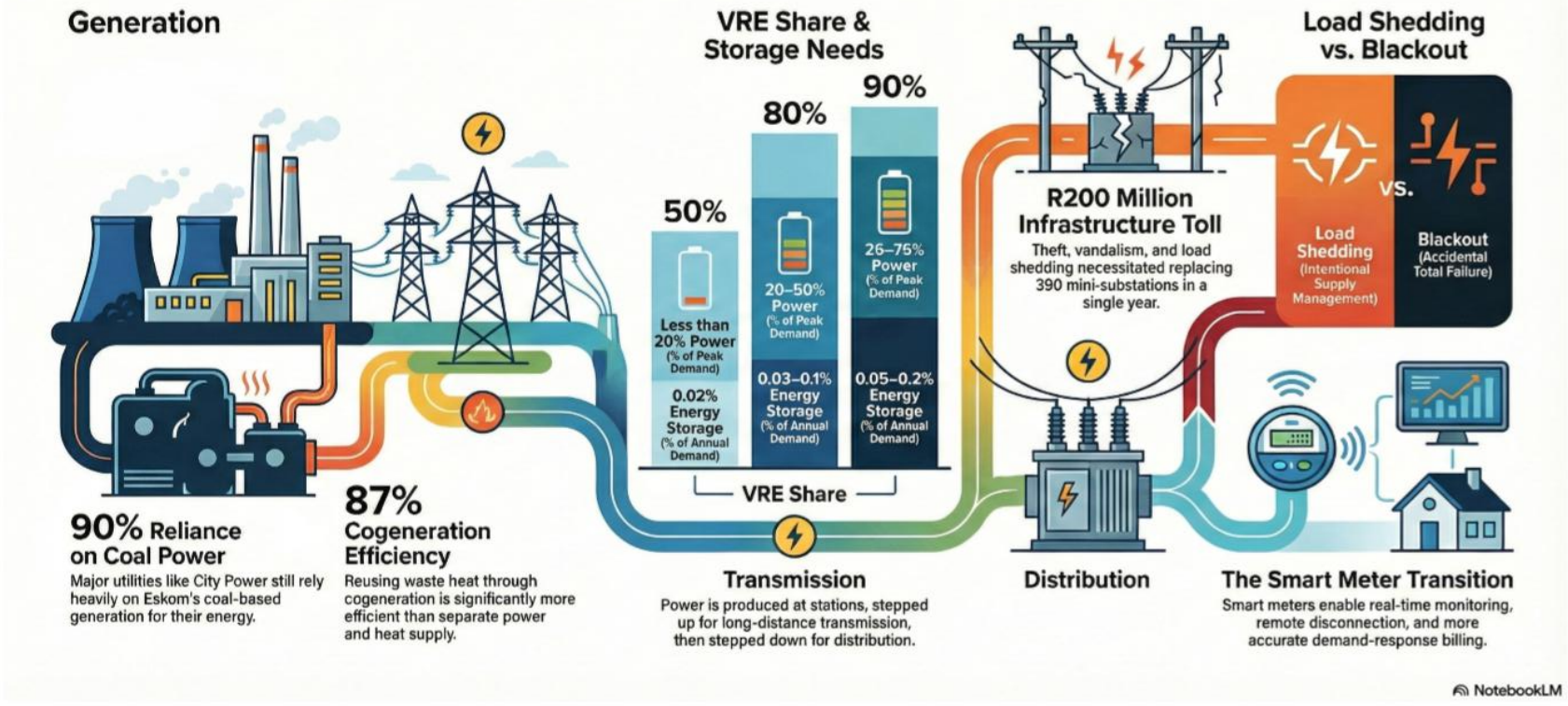
Resilience
Solvency achieved through technology (AMI) and localized generation.

A smarter, fragmented, and locally resilient City Power.

NotebookLM


The South African Power Landscape: Eskom, City Power, and the Grid's Future
ESKOM'S NATIONAL DOMINANCE
90%
Provides 90% of South Africa's power, primarily through massive coal-fired "six-pack" plants.
THE POWER GIANTS: 2020/21 DATA
Eskom (National)
Annual Revenue: R 204.3 Billion
Total Employees: 42,749
Total Assets: R 781 Billion
A GROWING DEBT CRISIS:
Joburg and City Power recently owed Eskom R3.4 billion for unpaid electricity services.
CITY POWER'S LOCAL MISSION
Wholly owned by Johannesburg, City Power maintains the distribution network for 3.2 million people.
Annual Revenue: R 17 Billion
Total Employees: 1,750
Total Assets: R 19.7 Billion
MODERNIZING FOR STABILITY
THE SMART METER TRANSITION
City Power aims to replace all meters by November 2024 to enable remote usage limiting.
20,400 MW
SOLAR & WIND TARGET
South Africa's Integrated Resource Plan (IRP) prioritizes massive renewable investments to reduce coal reliance.
COMBATTING INFRASTRUCTURE SABOTAGE
Theft and vandalism consumed 80% of City Power's substation budget in 2023.
NotebookLM

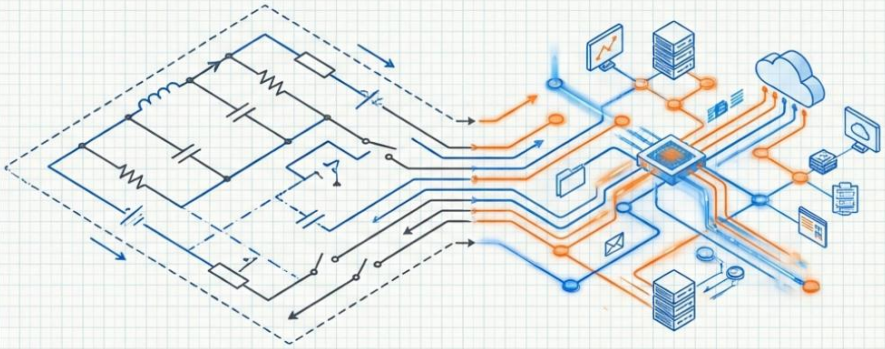
Powering the Future: The Evolution and Challenges of the Modern Electric Grid


Generation
VRE Share & Storage Needs
50%
80%
90%
Less than 20% Power (% of Peak Demand)
0.02% Energy Storage (% of Annual Demand)
20–50% Power (% of Peak Demand)
0.03–0.1% Energy Storage (% of Annual Demand)
26–75% Power (% of Peak Demand)
0.05–0.2% Energy Storage (% of Annual Demand)
VRE Share
Load Shedding vs. Blackout
R200 Million Infrastructure Toll
Theft, vandalism, and load shedding necessitated replacing 390 mini-substations in a single year.
Load Shedding (Intentional Supply Management)
VS.
Blackout (Accidental Total Failure)
90% Reliance on Coal Power
Major utilities like City Power still rely heavily on Eskom's coal-based generation for their energy.
87% Cogeneration Efficiency
Reusing waste heat through cogeneration is significantly more efficient than separate power and heat supply.
Transmission
Power is produced at stations, stepped up for long-distance transmission, then stepped down for distribution.
Distribution
The Smart Meter Transition
Smart meters enable real-time monitoring, remote disconnection, and more accurate demand-response billing.
NotebookLM

THE INTEGRATED ENGINEERING PORTFOLIO

SYNTHESIZING ACADEMIC RIGOUR, INDUSTRY ALIGNMENT, AND DIGITAL INNOVATION

A Comprehensive Review of the Career Pathway of Tshingombe Tshitadi (Engineering Student & Assessment Moderator)



REGULATORY COMPLIANCE (SAQA/DHET)

INDUSTRY APPLICATION (CITY POWER)

DIGITAL EVOLUTION (SALESFORCE)

BASED ON VERIFIED DHET TRANSCRIPTS, SAQA POLICIES, AND SALESFORCE TRAI NotebookLM

Professional Profile & Verification Data

ID Card

NAME:
Tshingombe Tshitadi

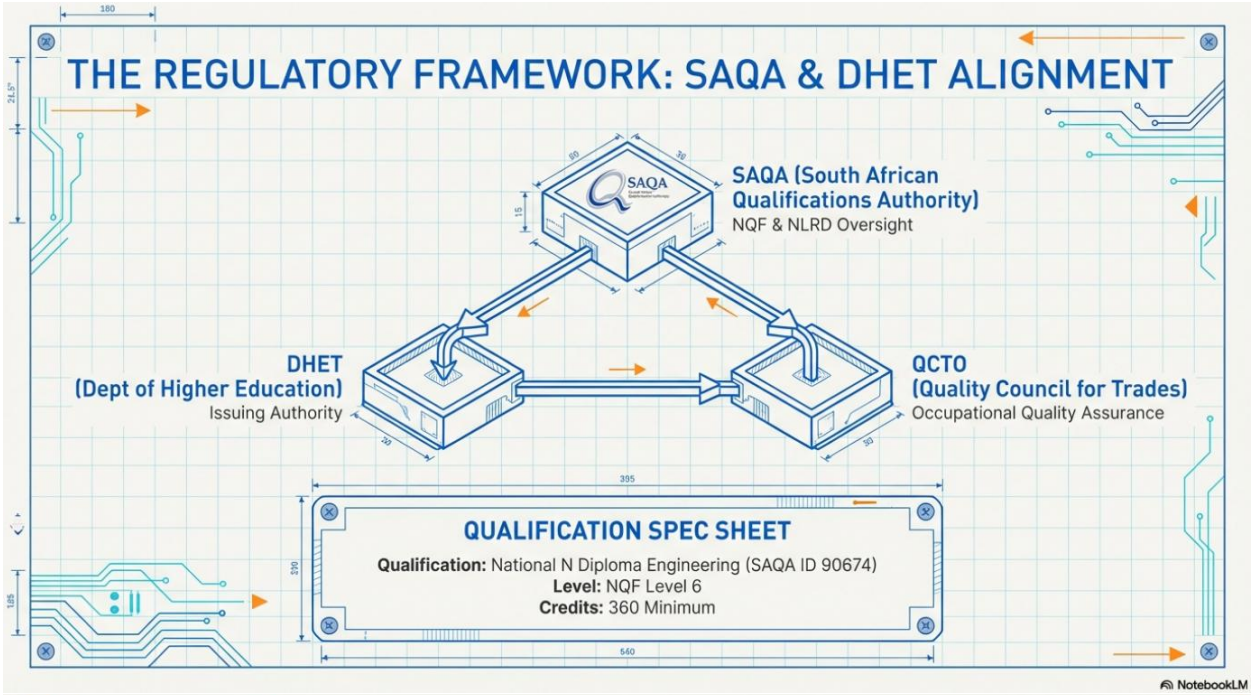
ROLES:
- Engineering Student (NATED / Report 191)
- Assessment Moderator
- Salesforce Trailblazer (Expeditioner Rank)

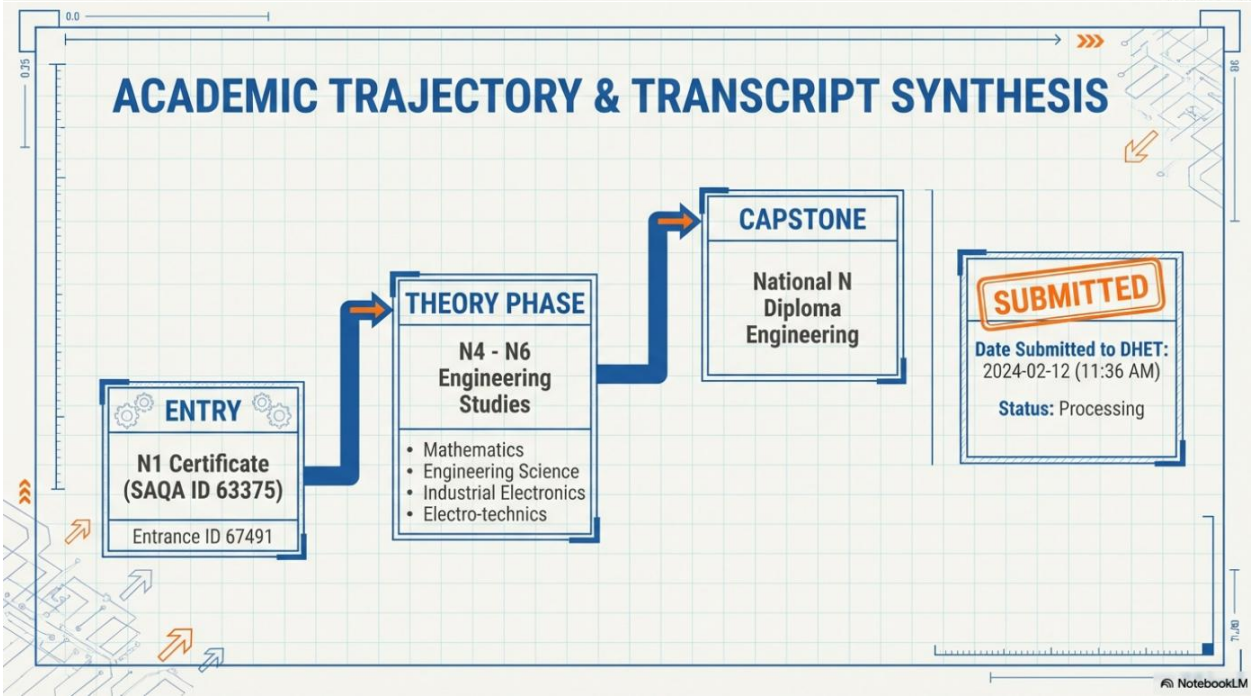
Verification Data

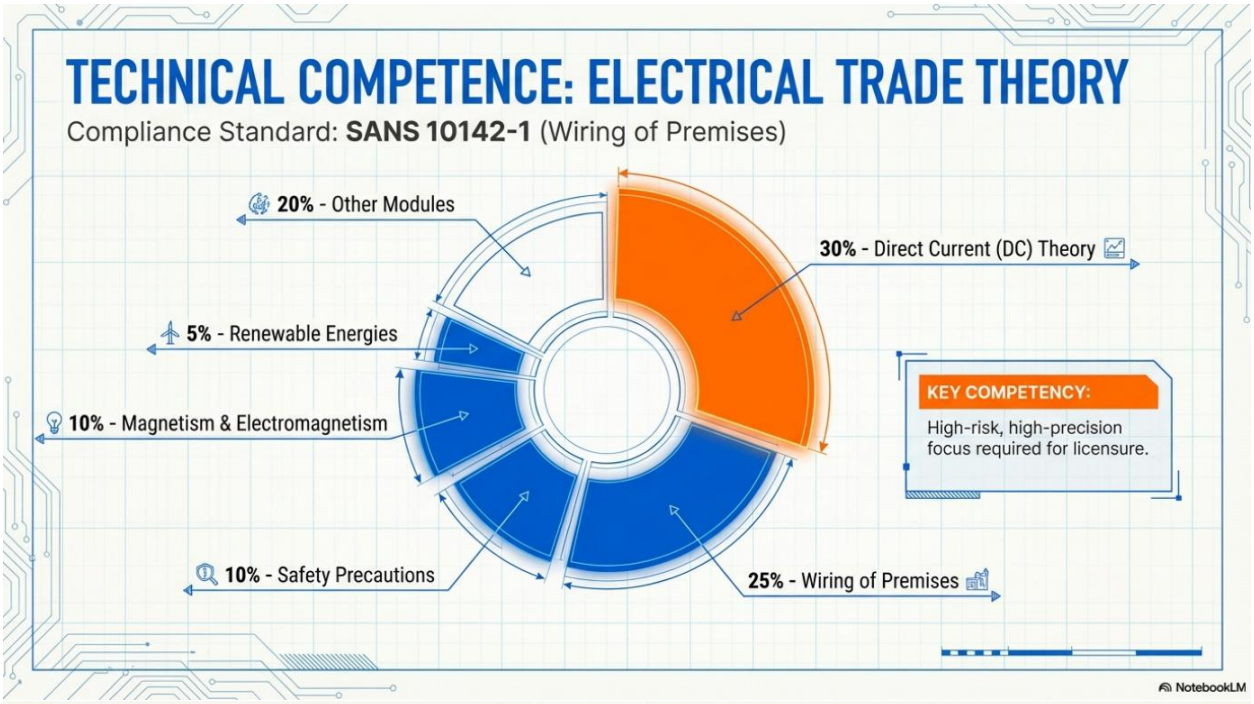
OFFICIAL VERIFICATION RECORD

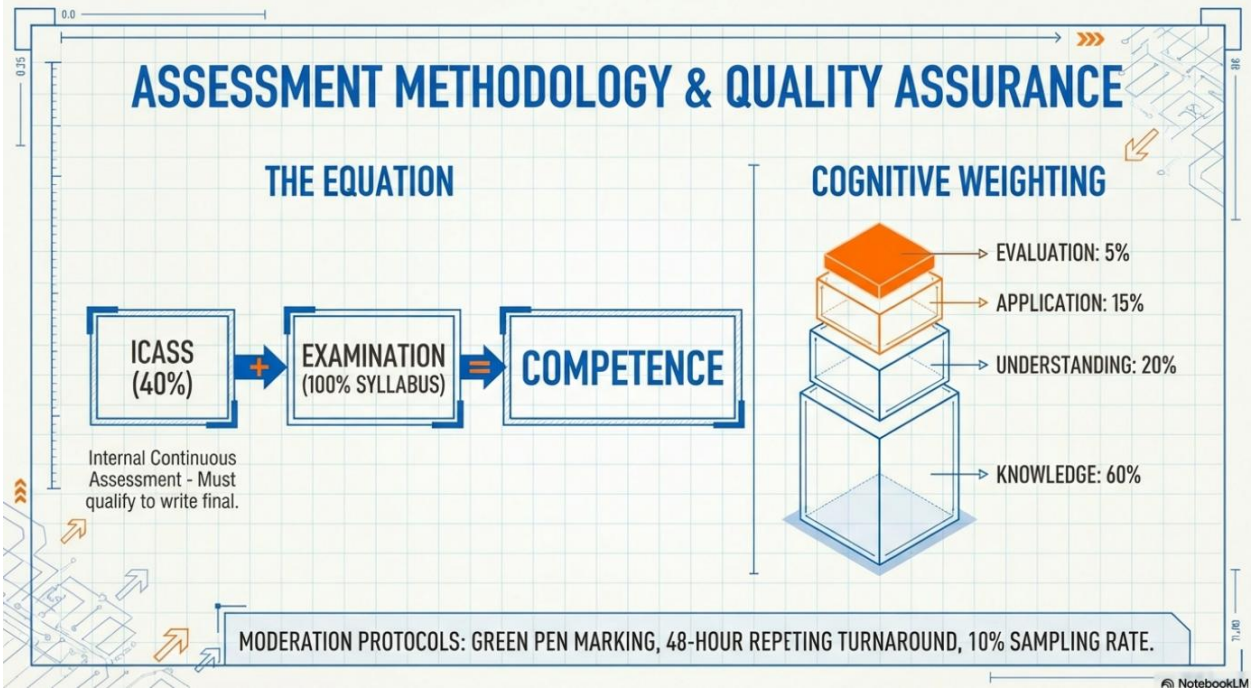
- SAQA Asset ID: 09121
- Institution Code: 30_39
- Assessment Policy Ref: IE099
- Learner ID 1: 2004007064381
- Learner ID 2: 2100002023812

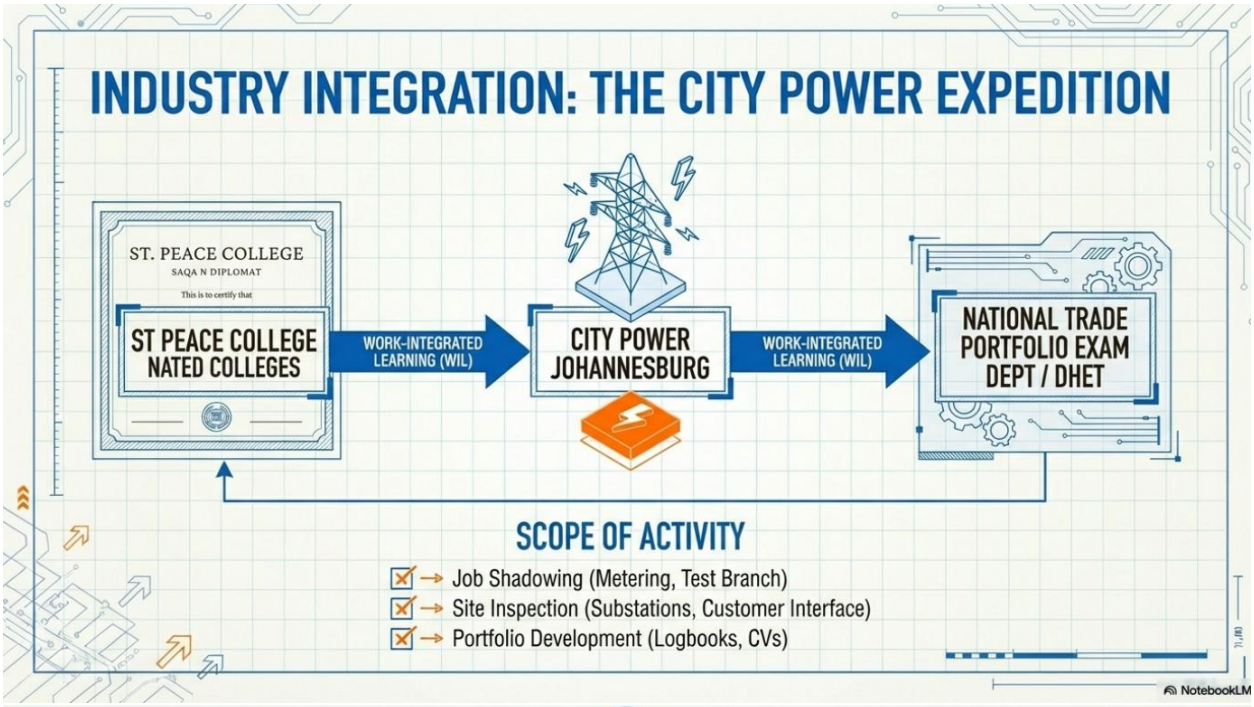
NotebookLM


THE REGULATORY FRAMEWORK: SAQA & DHET ALIGNMENT
SAQA (South African Qualifications Authority)
NQF & NLRD Oversight
DHET (Dept of Higher Education)
Issuing Authority
QCTO (Quality Council for Trades)
Occupational Quality Assurance
QUALIFICATION SPEC SHEET
Qualification: National N Diploma Engineering (SAQA ID 90674)
Level: NQF Level 6
Credits: 360 Minimum
NotebookLM

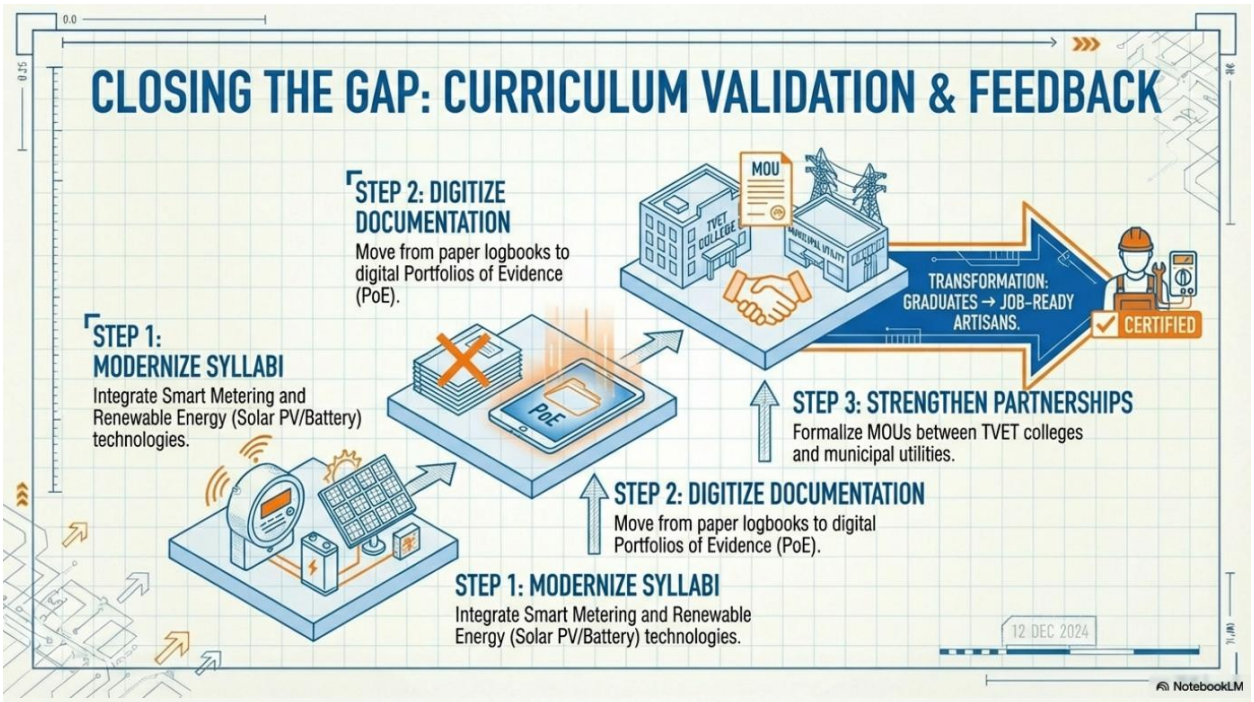

ACADEMIC TRAJECTORY & TRANSCRIPT SYNTHESIS
ENTRY
N1 Certificate (SAQA ID 63375)
Entrance ID 67491
THEORY PHASE
N4 - N6 Engineering Studies
Mathematics
Engineering Science
Industrial Electronics
Electro-technics
CAPSTONE
National N Diploma Engineering
SUBMITTED
Date Submitted to DHET:
2024-02-12 (11:36 AM)
Status: Processing
NotebookLM

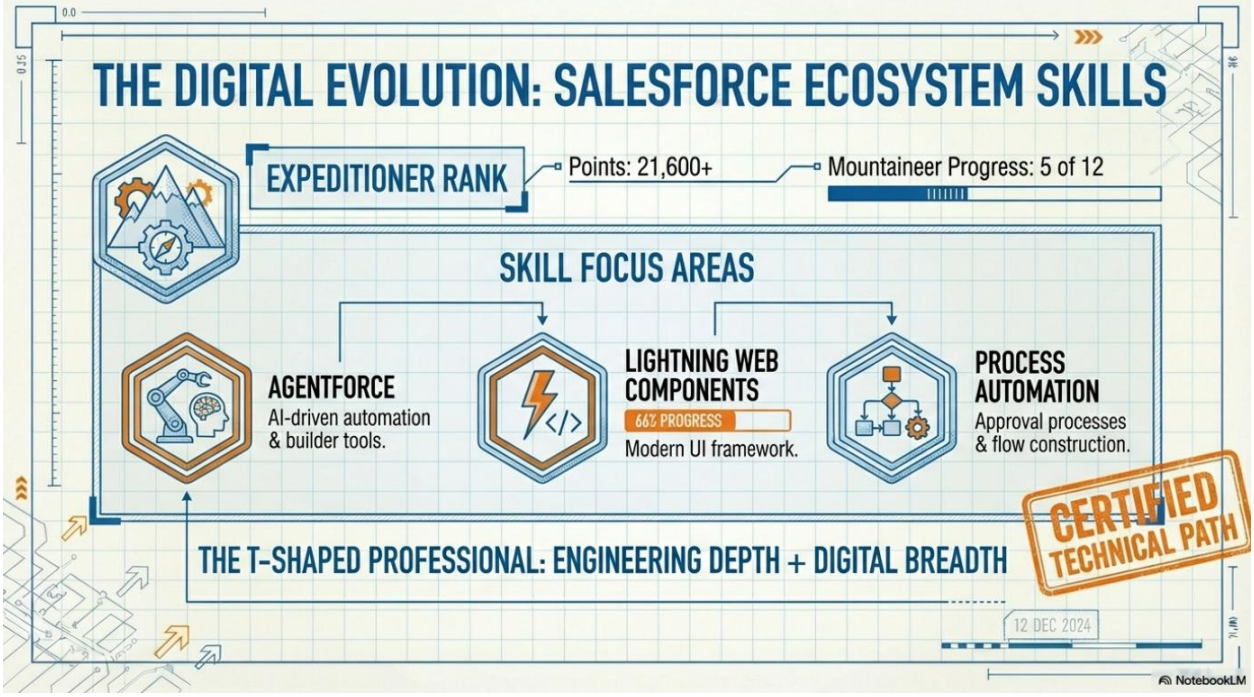

TECHNICAL COMPETENCE: ELECTRICAL TRADE THEORY
Compliance Standard: SANS 10142-1 (Wiring of Premises)
20% - Other Modules
30% - Direct Current (DC) Theory
5% - Renewable Energies
10% - Magnetism & Electromagnetism
10% - Safety Precautions
25% - Wiring of Premises
KEY COMPETENCY:
High-risk, high-precision focus required for licensure.
NotebookLM

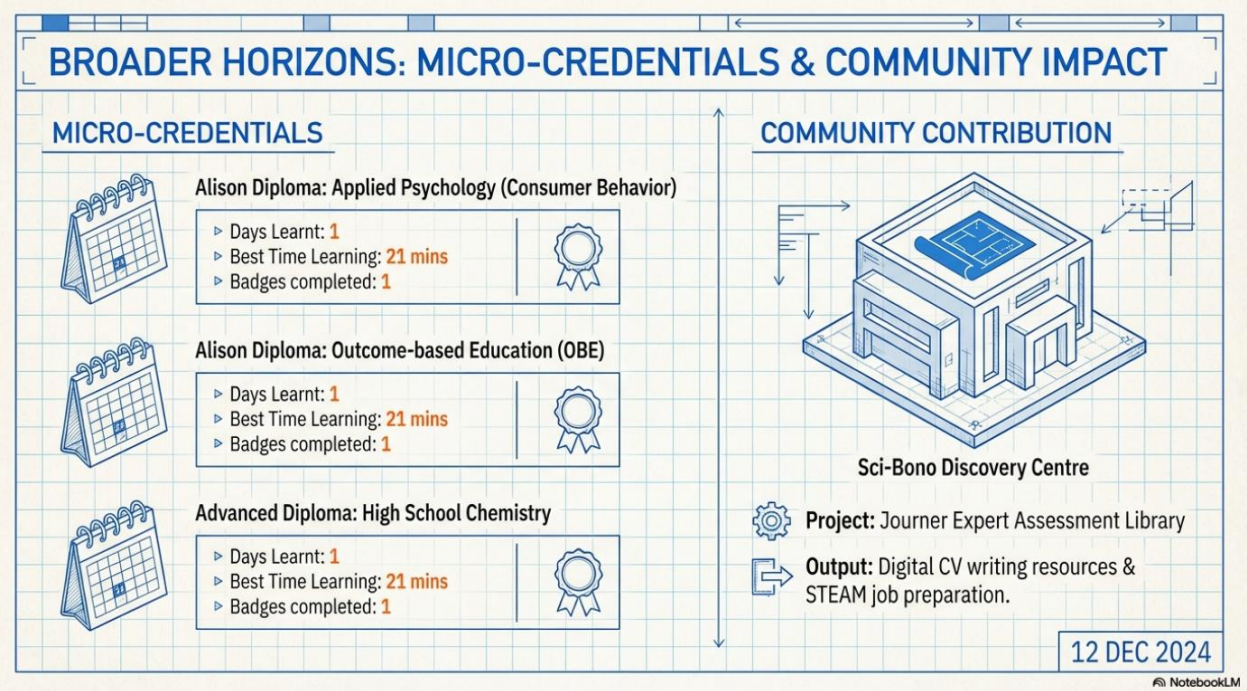

ASSESSMENT METHODOLOGY & QUALITY ASSURANCE
THE EQUATION
ICASS (40%)
EXAMINATION (100% SYLLABUS)
COMPETENCE
Internal Continuous Assessment - Must qualify to write final.
COGNITIVE WEIGHTING
EVALUATION: 5%
APPLICATION: 15%
UNDERSTANDING: 20%
KNOWLEDGE: 60%
MODERATION PROTOCOLS: GREEN PEN MARKING, 48-HOUR REPETING TURNAROUND, 10% SAMPLING RATE.
NotebookLM

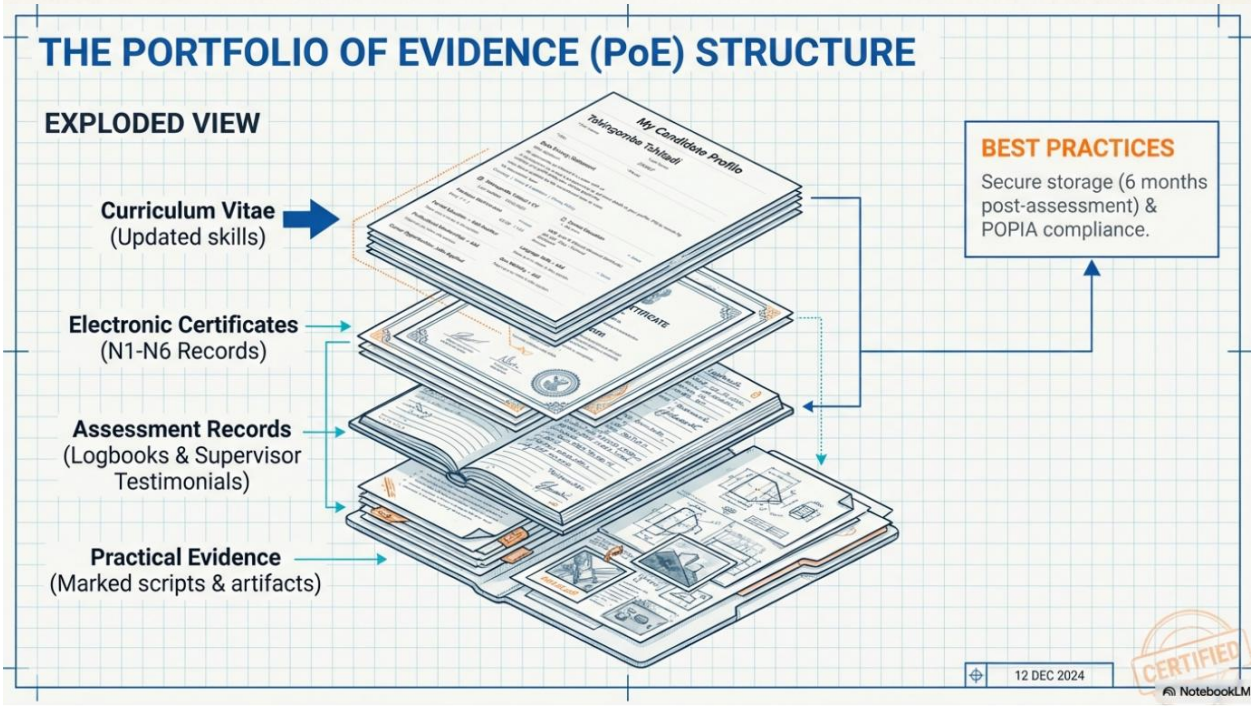

INDUSTRY INTEGRATION: THE CITY POWER EXPEDITION
ST. PEACE COLLEGE
SAQA N DIPLOMAT
This is to certify that
ST PEACE COLLEGE
NATED COLLEGES
WORK-INTEGRATED LEARNING (WIL)
CITY POWER JOHANNESBURG
WORK-INTEGRATED LEARNING (WIL)
NATIONAL TRADE PORTFOLIO EXAM
DEPT / DHET
SCOPE OF ACTIVITY
Job Shadowing (Metering, Test Branch)
Site Inspection (Substations, Customer Interface)
Portfolio Development (Logbooks, CVs)
NotebookLM

FIELD REPORT: OPERATIONAL REALITIES & FINDINGS
OBSERVATIONS
Units Visited: Metering & Test Branch
Grid Challenges: Impact of Load Shedding on training continuity
Service Delivery: Managing customer interface delays
TECHNICAL ALIGNMENT
Standard Verified: SANS 10142-1 →
Gap Analysis: Identified need for stronger alignment between classroom theory and on-site fault diagnosis.
FIELD REPORT VALIDATED
12 DEC 2024
NotebookLM


CLOSING THE GAP: CURRICULUM VALIDATION & FEEDBACK
STEP 2: DIGITIZE DOCUMENTATION
Move from paper logbooks to digital Portfolios of Evidence (PoE).
MOU
TVET COLLEGE
MUNICIPAL UTILITY
TRANSFORMATION: GRADUATES → JOB-READY ARTISANS.
CERTIFIED
STEP 1: MODERNIZE SYLLABI
Integrate Smart Metering and Renewable Energy (Solar PV/Battery) technologies.
PoE
STEP 3: STRENGTHEN PARTNERSHIPS
Formalize MOUs between TVET colleges and municipal utilities.
STEP 2: DIGITIZE DOCUMENTATION
Move from paper logbooks to digital Portfolios of Evidence (PoE).
STEP 1: MODERNIZE SYLLABI
Integrate Smart Metering and Renewable Energy (Solar PV/Battery) technologies.
12 DEC 2024
NotebookLM

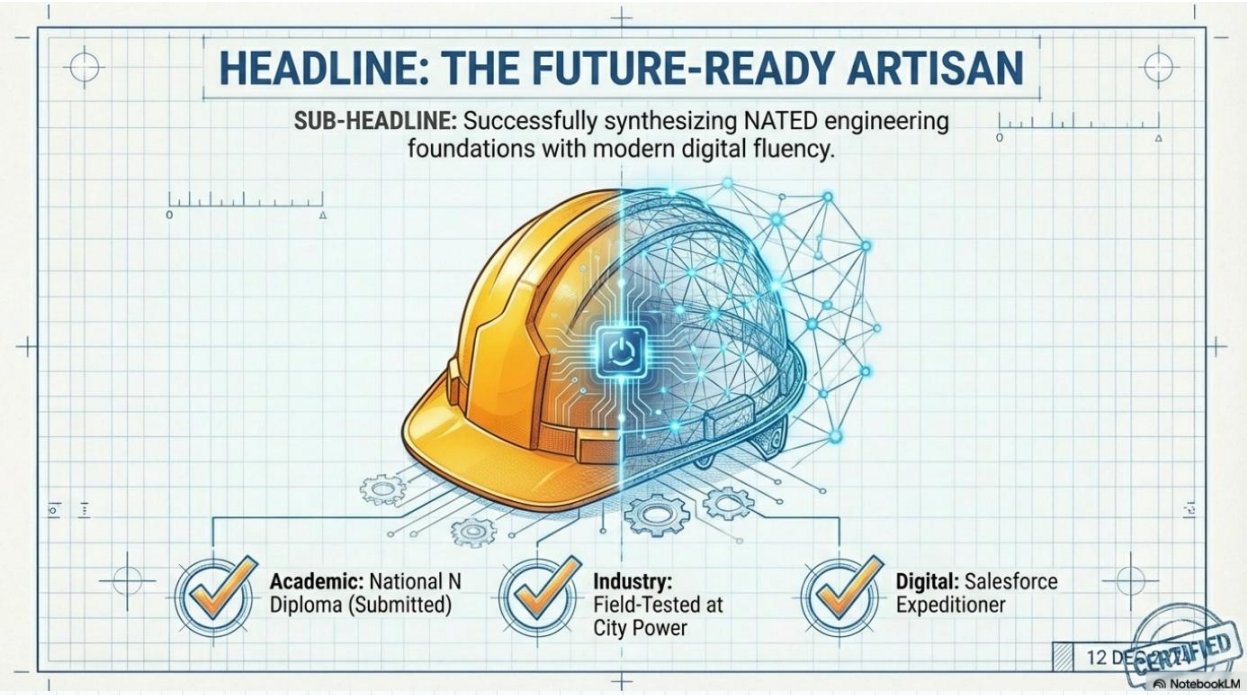

THE DIGITAL EVOLUTION: SALESFORCE ECOSYSTEM SKILLS
EXPEDITIONER RANK
Points: 21,600+
Mountaineer Progress: 5 of 12
SKILL FOCUS AREAS
AGENTFORCE
AI-driven automation & builder tools.
LIGHTNING WEB COMPONENTS
66% PROGRESS
Modern UI framework.
PROCESS AUTOMATION
Approval processes & flow construction.
CERTIFIED TECHNICAL PATH
THE T-SHAPED PROFESSIONAL: ENGINEERING DEPTH + DIGITAL BREADTH
12 DEC 2024
NotebookLM

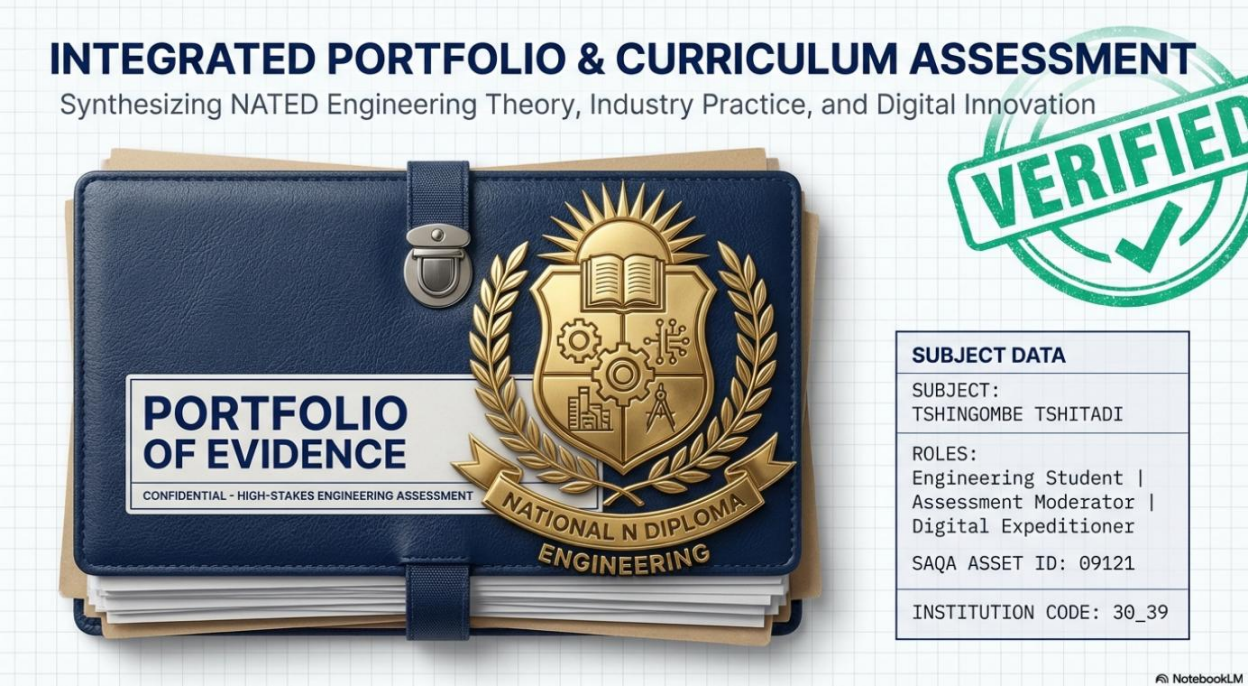

BROADER HORIZONS: MICRO-CREDENTIALS & COMMUNITY IMPACT
MICRO-CREDENTIALS
Alison Diploma: Applied Psychology (Consumer Behavior)
Days Learnt: 1
Best Time Learning: 21 mins
Badges completed: 1
Alison Diploma: Outcome-based Education (OBE)
Days Learnt: 1
Best Time Learning: 21 mins
Badges completed: 1
Advanced Diploma: High School Chemistry
Days Learnt: 1
Best Time Learning: 21 mins
Badges completed: 1
COMMUNITY CONTRIBUTION
Sci-Bono Discovery Centre
Project: Journer Expert Assessment Library
Output: Digital CV writing resources & STEAM job preparation.
12 DEC 2024
NotebookLM


THE PORTFOLIO OF EVIDENCE (PoE) STRUCTURE
EXPLODED VIEW
Curriculum Vitae
(Updated skills)
Electronic Certificates
(N1-N6 Records)
Assessment Records
(Logbooks & Supervisor Testimonials)
Practical Evidence
(Marked scripts & artifacts)
My Candidate Profile
BEST PRACTICES
Secure storage (6 months post-assessment) & POPIA compliance.
12 DEC 2024
CERTIFIED
NotebookLM

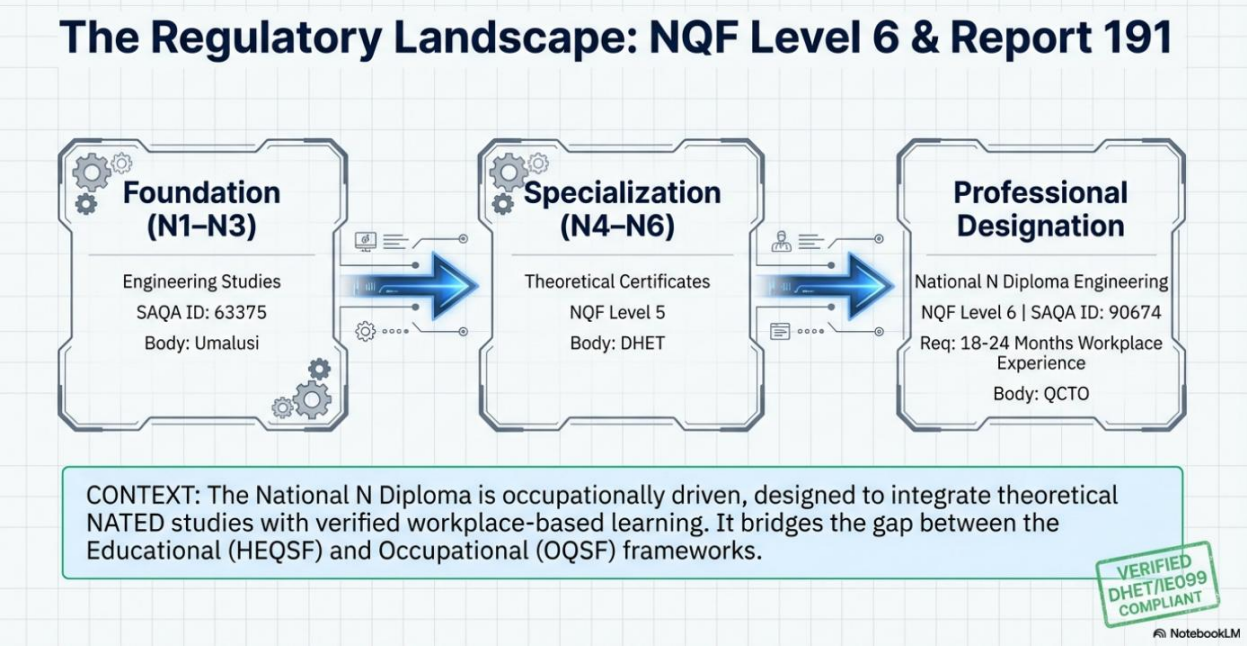
DATA INTEGRITY, SECURITY & VERIFICATION
ANTI-FRAUD
WATERMARKS, HOLOGRAMS, ANTI-COPY BACKGROUNDS
DIGITAL LINK
SAQA/INSTITUTIONAL PORTALS
CERTIFICATE VERIFICATION
AUDIT TRAIL
UNIQUE SERIAL NUMBERS
DATA PRIVACY
POPIA Compliance & Record Merging:
Cross-referencing Learner IDs (200400... / 210000...) to prevent duplication.
12 DEC 2024
NotebookLM

STRATEGIC PATH FORWARD
START
PATH A: THE PROFESSIONAL
(TSHINGOMBE)
MILESTONE 1:
Complete Agentforce learning paths.
MILESTONE 2:
Reach "Ranger" Rank (Maintain streaks).
MILESTONE 3:
Finalize National Diploma logbooks.
PATH B: THE SECTOR
(NATED/TVET)
MILESTONE 1:
Update curricula for "Load Shedding" resilience.
MILESTONE 2:
Implement blockchain verification.
MILESTONE 3:
Enhance Work-Integrated Learning (WIL) monitoring.
CERTIFIED
NotebookLM


HEADLINE: THE FUTURE-READY ARTISAN
SUB-HEADLINE: Successfully synthesizing NATED engineering foundations with modern digital fluency.
Academic: National N Diploma (Submitted)
Industry: Field-Tested at City Power
Digital: Salesforce Expeditioner
CERTIFIED
NotebookLM


INTEGRATED PORTFOLIO & CURRICULUM ASSESSMENT
Synthesizing NATED Engineering Theory, Industry Practice, and Digital Innovation
VERIFIED
PORTFOLIO OF EVIDENCE
CONFIDENTIAL - HIGH-STAKES ENGINEERING ASSESSMENT
NATIONAL N DIPLOMA
ENGINEERING
SUBJECT DATA
SUBJECT:
TSHINGOMBE TSHITADI
ROLES:
Engineering Student |
Assessment Moderator |
Digital Expeditioner
SAQA ASSET ID: 09121
INSTITUTION CODE: 30_39
NotebookLM

The Learner Profile: Bridging Trade Theory and Digital Automation
Candidate Profile Card
Name: Tshingombe Tshitadi
ID Ref: 2004007064381 / 2100002023812
Rank: Salesforce Expeditioner
Status: Assessment Moderator
Core Qualification
National N Diploma Engineering (NQF Level 6)
SAQA ID: 90674
Professional Summary
A prototype for the modern artisan—combining the rigorous technical foundation of the NATED Report 191 framework with cutting-cutting-edge proficiency in Salesforce/Agentforce automation.
Professional Summary
A prototype for the modern artisan—combining the rigorous technical foundation of the NATED Report 191 framework with cutting-edge in Salesforce/Agentforce automation.
Verification Status
VERIFIED DHET/IE099 COMPLIANT
DHET Status: Submitted (2024-02-12)
Policy: Compliant with IE099
NotebookLM


The Regulatory Landscape: NQF Level 6 & Report 191
Foundation (N1–N3)
Engineering Studies
SAQA ID: 63375
Body: Umalusi
Specialization (N4–N6)
Theoretical Certificates
NQF Level 5
Body: DHET
Professional Designation
National N Diploma Engineering
NQF Level 6 | SAQA ID: 90674
Req: 18-24 Months Workplace Experience
Body: QCTO
CONTEXT: The National N Diploma is occupationally driven, designed to integrate theoretical NATED studies with verified workplace-based learning. It bridges the gap between the Educational (HEQSF) and Occupational (OQSF) frameworks.
VERIFIED DHET/IE099 COMPLIANT
NotebookLM

DHET Transcript Synthesis: Academic Progression (N1–N6)

Progress Stack

Level	Subject Focus	Status	Date
N1 Certificate	Mathematics, Engineering Science, Ind. Electronics	PENDING	Jan 2023
N1–N3 Progression	Electro-technics, Trade Theory	SUBMITTED	May 2023
N4–N6 Advanced	Supervisory Management, Power Machines	VERIFIED	Feb 2024

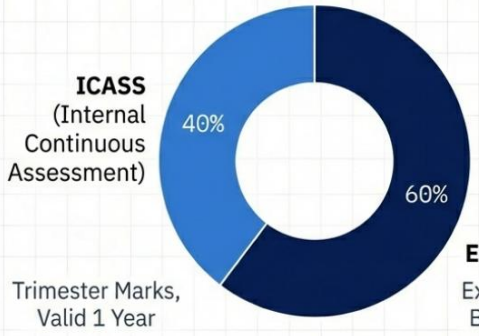
Submission Timeline

- Pending (Jan 2023)
- Submitted to DHET (11/05/2023)
- Final Status: SUBMITTED (2024-02-12 11:36)

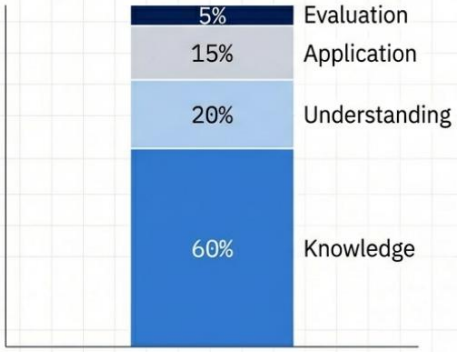
Timetable Ref: /50111002 | Entrance ID: 67491

Assessment Methodology: Ensuring Cognitive Rigor

Final Mark Composition



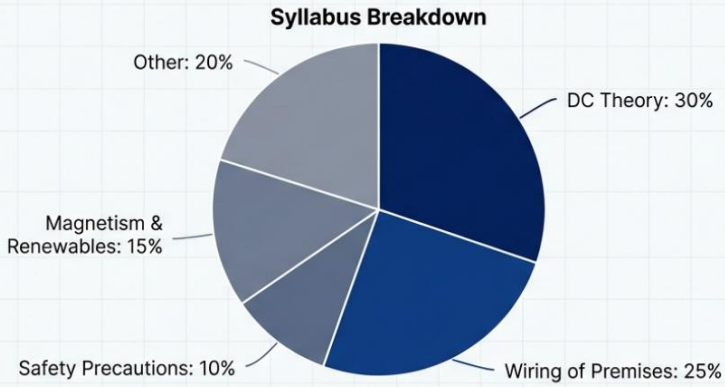
Cognitive Demand Weighting



PASS REQUIREMENT

Minimum Promotion Mark = 40% (Combined ICASS + Exam)

Module Deep Dive: Electrical Trade Theory Standards



Compliance Checklist
SANS 10142-1 (Wiring Code)
IEC Standards (International Electrical Committee)
Calculations to 3 decimal places
Drawings: Neat, labeled, large scale

Core competency focuses on the practical installation standards and safety protocols mandated by the Occupational Health and Safety Act.

NotebookLM

Workplace Integration: The City Power Site Visit

OBJECTIVE

CONTEXT

St Peace College / NATED Colleges → Curriculum Validation Visit → City Power Johannesburg

OBJECTIVE:

To validate the NATED Engineering curriculum against live municipal grid operations and evaluate National Trade Portfolios.

Education	Industry	Regulation
TVET Colleges, St Peace College	City Power (Johannesburg)	DHET, National Trade Portfolio Exam Dept

NotebookLM

Operational Reality: Friction Between Theory and Practice

The Assignment

Activity: Job Shadowing

Locations: Metering Unit, Test Branch, Customer Interface

Goal: Inspect renewable integration and smart metering.

CAUTION // OPERATIONAL CHALLENGES

The Reality

⚠ **Challenge 1: Load Shedding**
Power outages disrupted practical training sessions.

⚠ **Challenge 2: Access Control**
Security delays (PSIRA protocols) and site ambiguity.

Challenge 3: Documentation Lag
Delays in logbook signing and portfolio verification.

OUTCOME: Students gained critical exposure to 'formal engineering duties' and OHSA safety protocols despite operational friction.

NotebookLM

Findings: The Curriculum vs. Industry Gap

Gap Analysis Matrix

	Current NATED Syllabus		Industry Requirement
1	DC Theory & Basic Wiring	GAP DETECTED →	Smart Metering & Digital Systems
2	Standard Grid Maintenance	URGENT UPDATE →	Renewable Energy (Solar PV, Battery Storage)

The curriculum must be updated to align with SANS 10142-1:2024 Edition 3.2, which specifically incorporates renewable energy systems.

NotebookLM

Digital Upskilling: The Salesforce Trailblazer Journey

Trailhead Profile

Rank: **EXPEDITIONER**

Points:	Badges:	Rank Progress:
21,600	50+	Mountaineer (5/12)

FOCUS AREAS

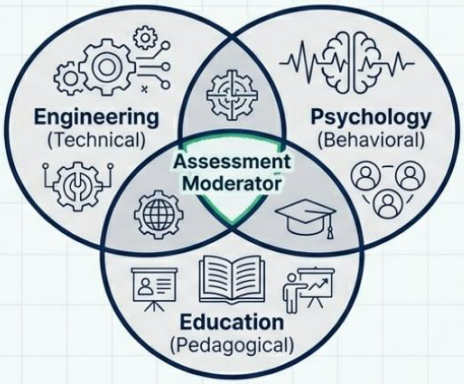
- Agentforce (AI-Driven Automation)
- Lightning Web Components
- Robotic Process Automation (RPA)

VERIFIED

METHODOLOGY: Usage of 'Superbadges' serves as serves as digital proxies for trade tests, proving applied skills in real-world business scenarios.

NotebookLM

Beyond the Trade: Pedagogy & Soft Skills



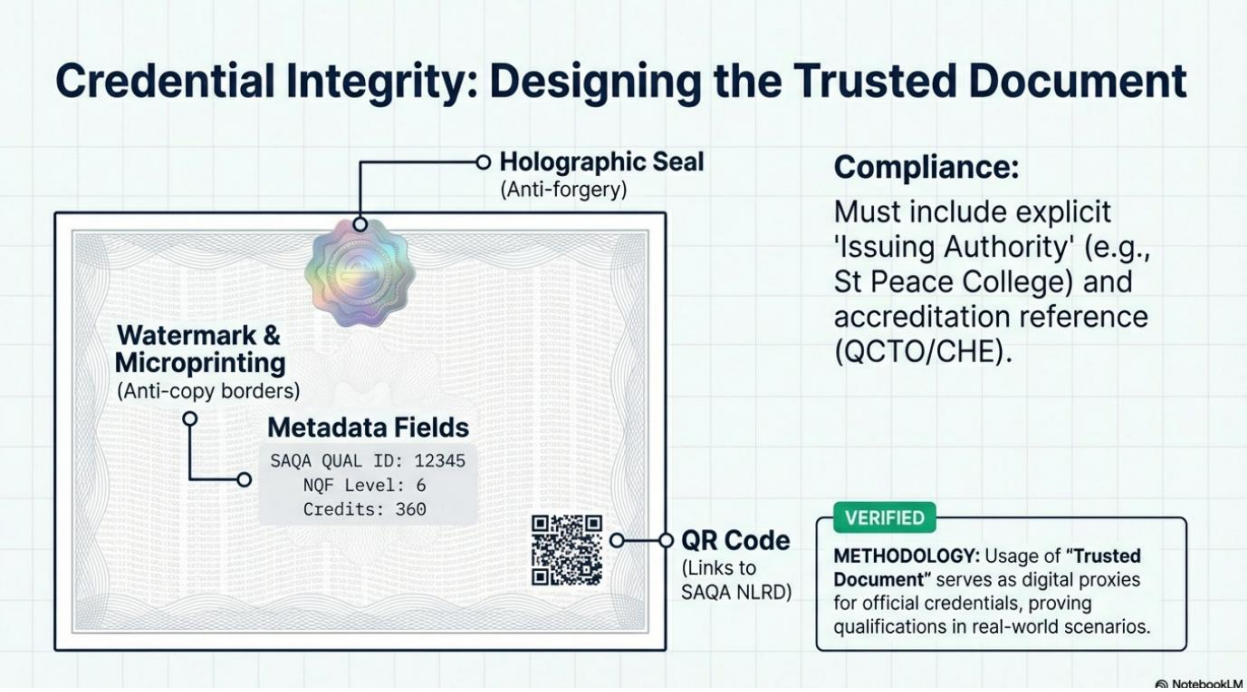
Interdisciplinary Qualifications

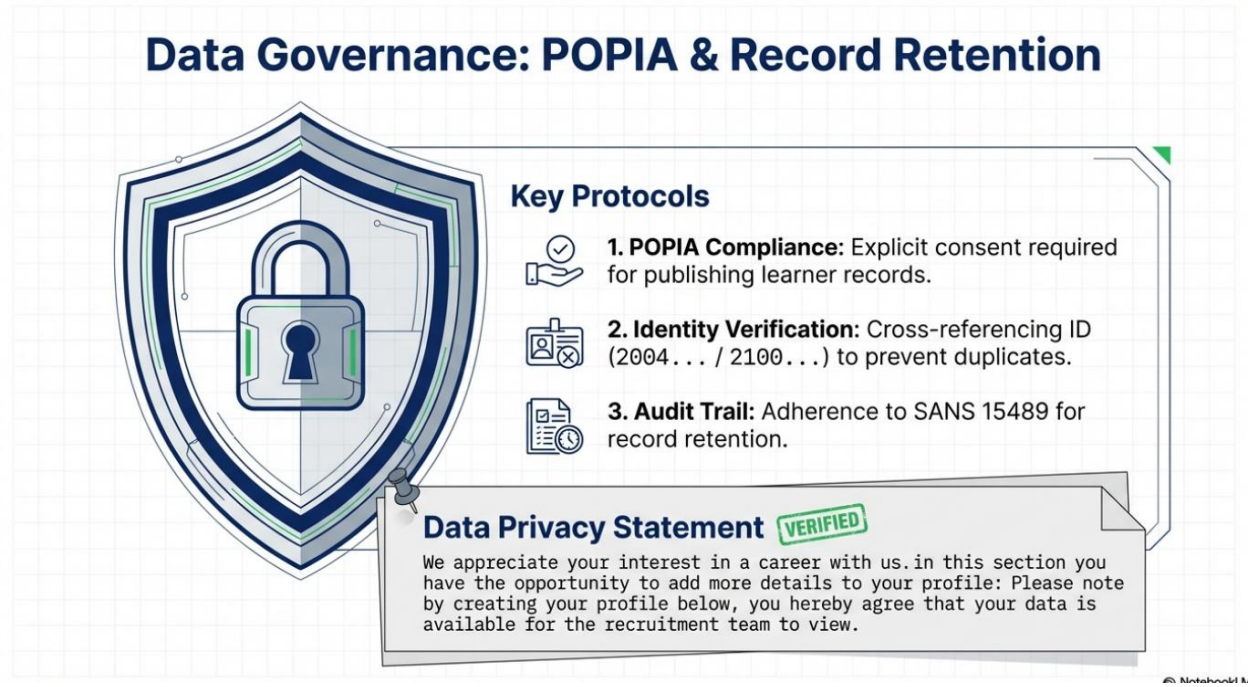
- Diploma in Applied Psychology (Consumer Behavior)
- Diploma in Outcome-based Education (OBE) & Academic QA

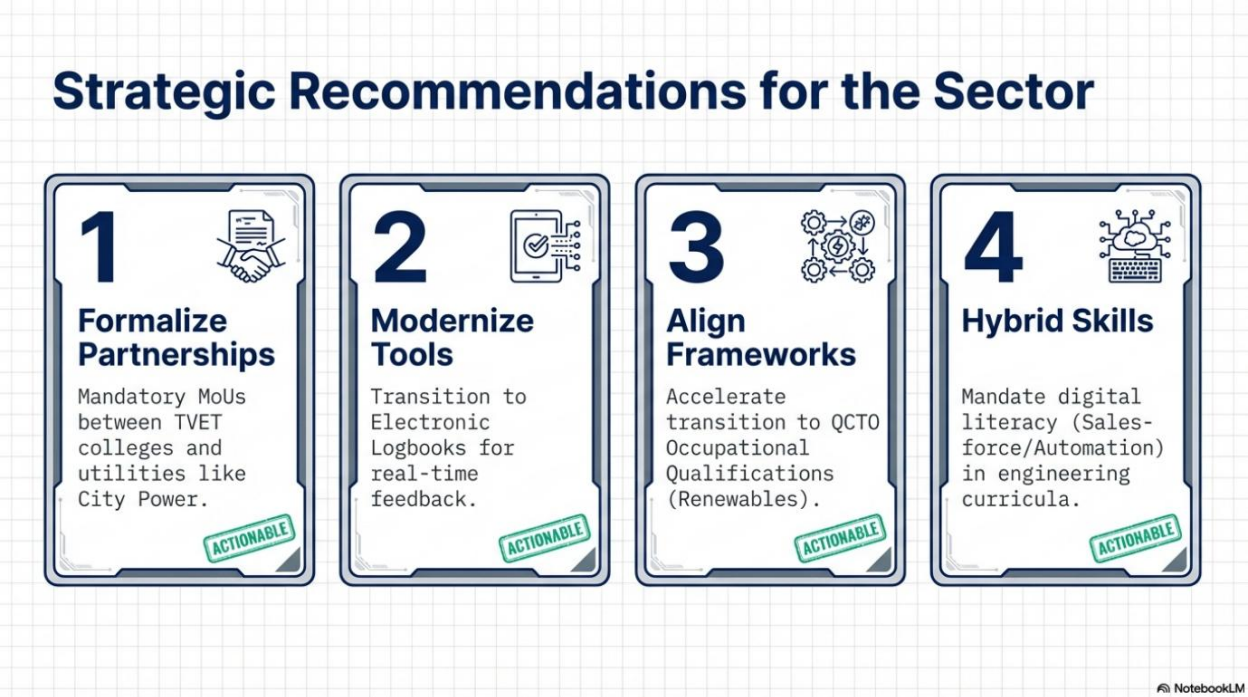
Applied Contribution

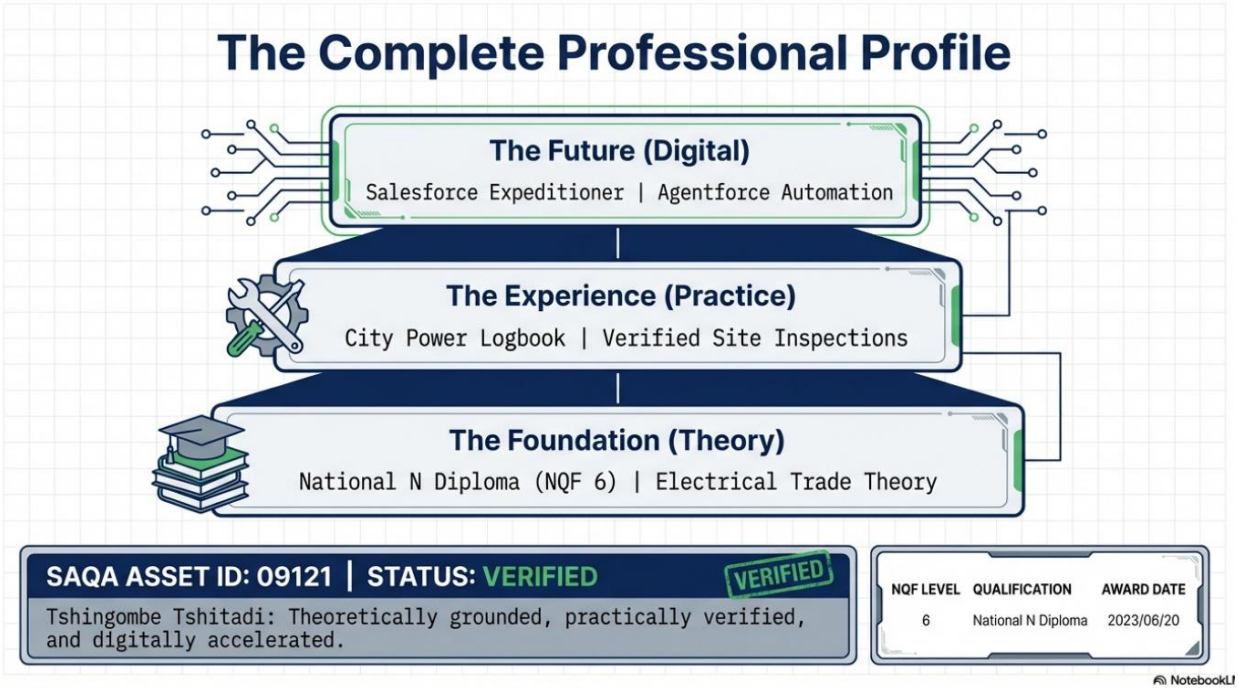
Work with Sci-Bono Discovery Centre (STEM Education): Developing the 'Journer Expert Assessment Library' and technical documentation for future artisans.

NotebookLM


Credential Integrity: Designing the Trusted Document
Holographic Seal
(Anti-forgery)
Watermark & Microprinting
(Anti-copy borders)
Metadata Fields
SAQA QUAL ID: 12345
NQF Level: 6
Credits: 360
QR Code
(Links to SAQA NLRD)
Compliance:
Must include explicit 'Issuing Authority' (e.g., St Peace College) and accreditation reference (QCTO/CHE).
VERIFIED
METHODOLOGY: Usage of "Trusted Document" serves as digital proxies for official credentials, proving qualifications in real-world scenarios.


Data Governance: POPIA & Record Retention
Key Protocols
1. POPIA Compliance: Explicit consent required for publishing learner records.
2. Identity Verification: Cross-referencing ID (2004... / 2100...) to prevent duplicates.
3. Audit Trail: Adherence to SANS 15489 for record retention.
Data Privacy Statement
VERIFIED
We appreciate your interest in a career with us.in this section you have the opportunity to add more details to your profile: Please note by creating your profile below, you hereby agree that your data is available for the recruitment team to view.


Strategic Recommendations for the Sector
1
Formalize Partnerships
Mandatory MoUs between TVET colleges and utilities like City Power.
ACTIONABLE
2
Modernize Tools
Transition to Electronic Logbooks for real-time feedback.
ACTIONABLE
3
Align Frameworks
Accelerate transition to QCTO Occupational Qualifications (Renewables).
ACTIONABLE
4
Hybrid Skills
Mandate digital literacy (Sales-force/Automation) in engineering curricula.
ACTIONABLE
NotebookLM


The Complete Professional Profile
The Future (Digital)
Salesforce Expeditioner | Agentforce Automation
The Experience (Practice)
City Power Logbook | Verified Site Inspections
The Foundation (Theory)
National N Diploma (NQF 6) | Electrical Trade Theory
SAQA ASSET ID: 09121 | STATUS: VERIFIED
VERIFIED
Tshingombe Tshitadi: Theoretically grounded, practically verified, and digitally accelerated.
NQF LEVEL
QUALIFICATION
AWARD DATE
6
National N Diploma
2023/06/20
NotebookLM

ST PRACE COLLEGE
EST. 20XX

Professional Qualification & Assessment Roadmap:

Tshingombe Tshitadi

Role: Engineering Student & Assessment Moderator

dhet SAQA

PROFESSIONAL IDENTITY & CORE CREDENTIALS

Profile: Engineering Student & Assessment Moderator

Holds SAQA Asset ID 09121 and is registered under Institutional Code 30_39.

NQF LEVEL 6 QUALIFICATION PATHWAY

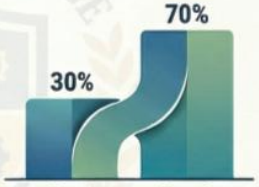
Pursuing the National N Diploma in Engineering (SAQA ID 90674) requiring 360 total credits.

DIVERSE PROFESSIONAL CERTIFICATIONS

- Alison Diplomas in Applied Psychology and Outcome-based Education
- Trailhead Expeditioner Rank

ENGINEERING ASSESSMENT STANDARDS

ICASS TRIMESTER WEIGHTING



Trimester marks are calculated as Test 1 (30%) and Test 2 (70%).

ELECTRICAL TRADE THEORY FOCUS

- **DC Theory** (30%)
- **Wiring of Premises** (25%)
- **Safety** (10%)

REGULATORY COMPLIANCE STANDARDS

All work adheres to SANS 10142-1, IEC symbols, and SI measurement standards.

NATED N4–N6 ENGINEERING SUBJECT PROGRESSION

N4 CERTIFICATE
Mathematics
Engineering Science
Industrial Electronics

N5 CERTIFICATE
Electro-technics
Digital Electronics
Power Machines

N6 CERTIFICATE
Control Systems
Installation Rules
Specialized Electric Codes

ZA-STP-2024-09121-T

SECURE DIGITAL TRANSMISSION • SECURE DIGITAL TRANSMISSION

NotebookLM

ST PRACE COLLEGE
EST. 20XX

Professional Qualification & Assessment Roadmap:

Tshingombe Tshitadi

Role: Engineering Student & Assessment Moderator

dhet SAQA

PROFESSIONAL IDENTITY & CORE CREDENTIALS

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DIVERSE PROFESSIONAL CERTIFICATIONS

- Alison Diplomas in Applied Psychology and Outcome-based Education
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ENGINEERING ASSESSMENT STANDARDS

ICASS TRIMESTER WEIGHTING

Trimester marks are calculated as Test 1 (30%) and Test 2 (70%).

ELECTRICAL TRADE THEORY FOCUS

- **DC Theory** (30%)
- **Wiring of Premises** (25%)
- **Safety** (10%)

REGULATORY COMPLIANCE STANDARDS

All work adheres to SANS 10142-1, IEC symbols, and SI measurement standards.

NATED N4–N6 ENGINEERING SUBJECT PROGRESSION

N4 CERTIFICATE
Mathematics
Engineering Science
Industrial Electronics

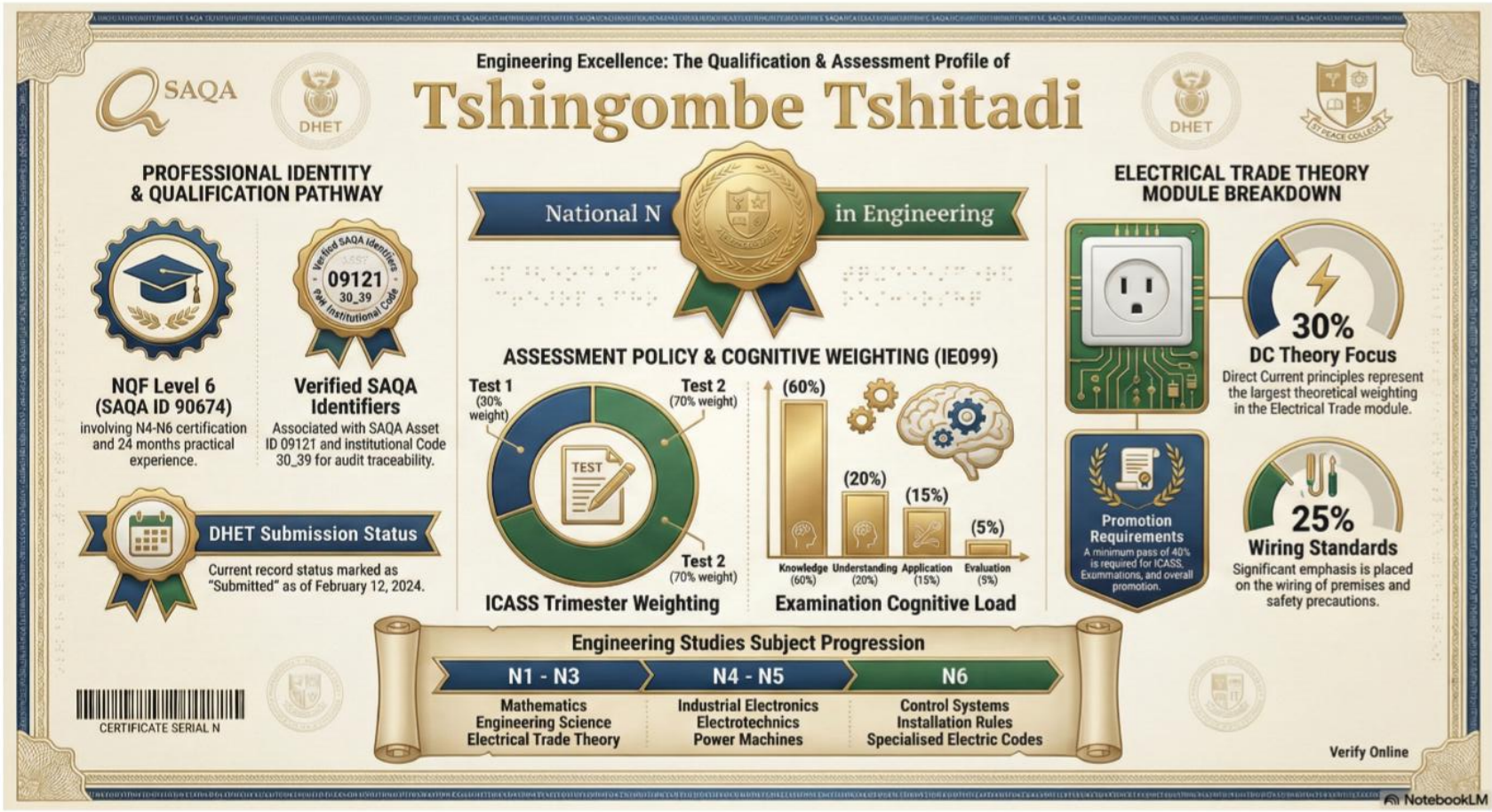
N5 CERTIFICATE
Electro-technics
Digital Electronics
Power Machines

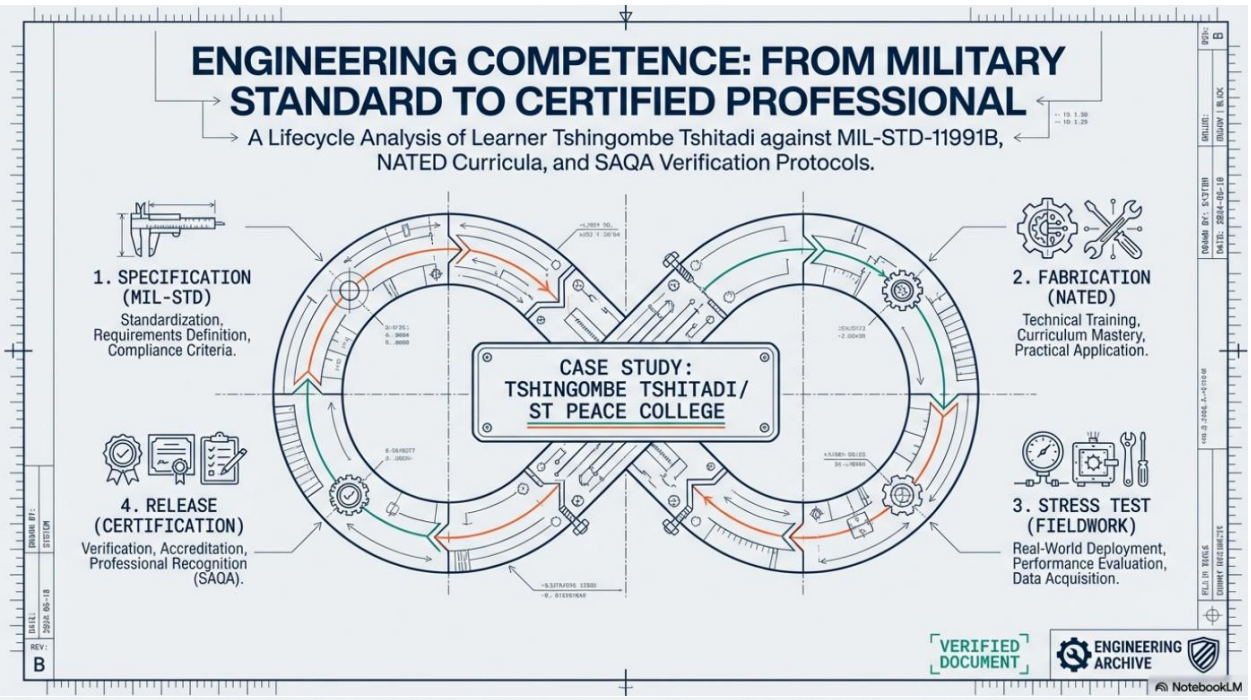
N6 CERTIFICATE
Control Systems
Installation Rules
Specialized Electric Codes

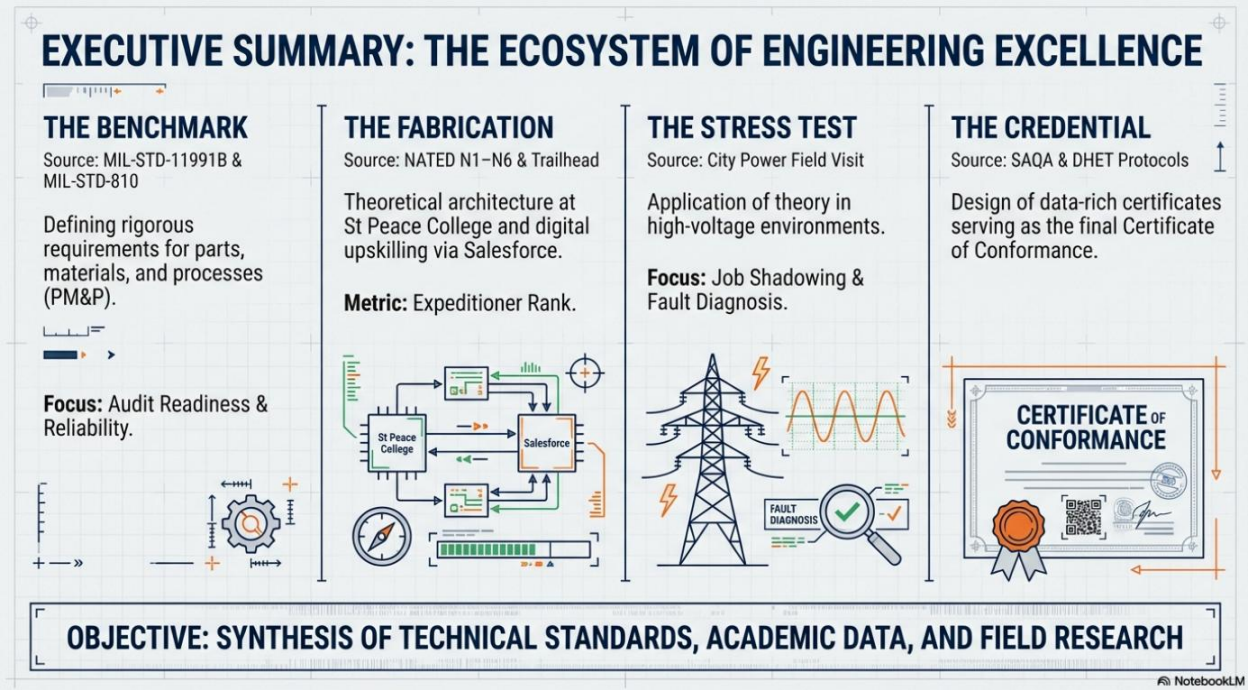
ZA-STP-2024-09121-T

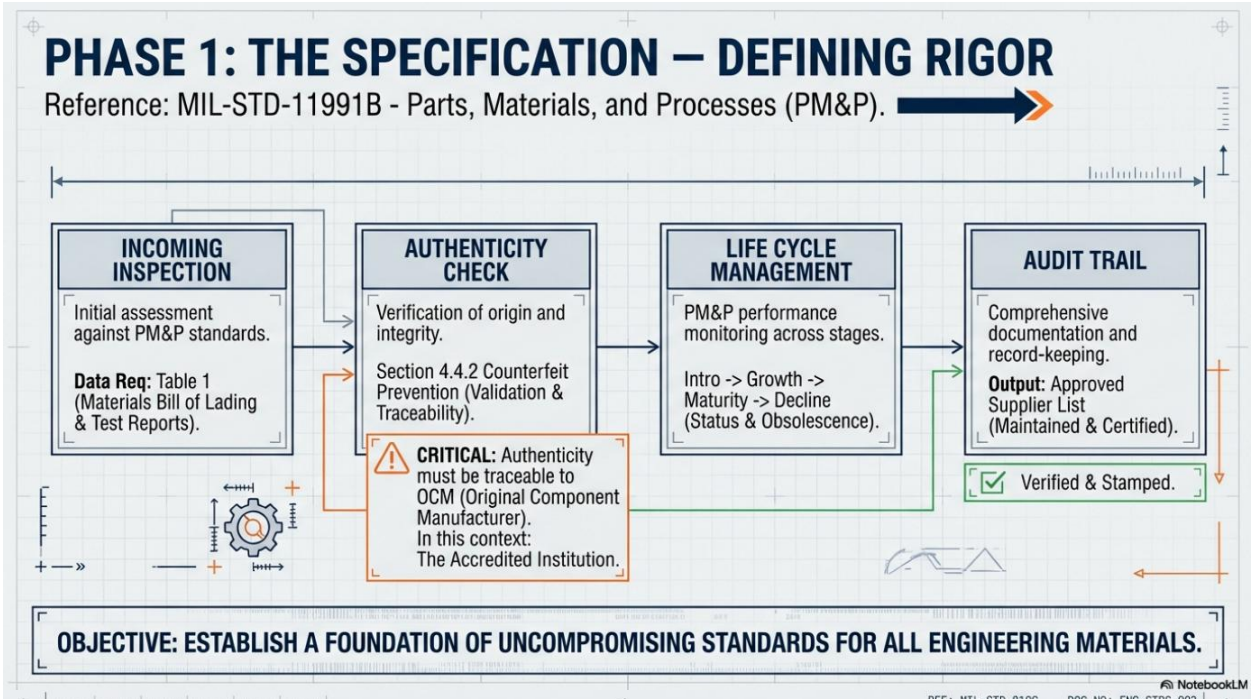
SECURE DIGITAL TRANSMISSION • SECURE DIGITAL TEACHING WAY

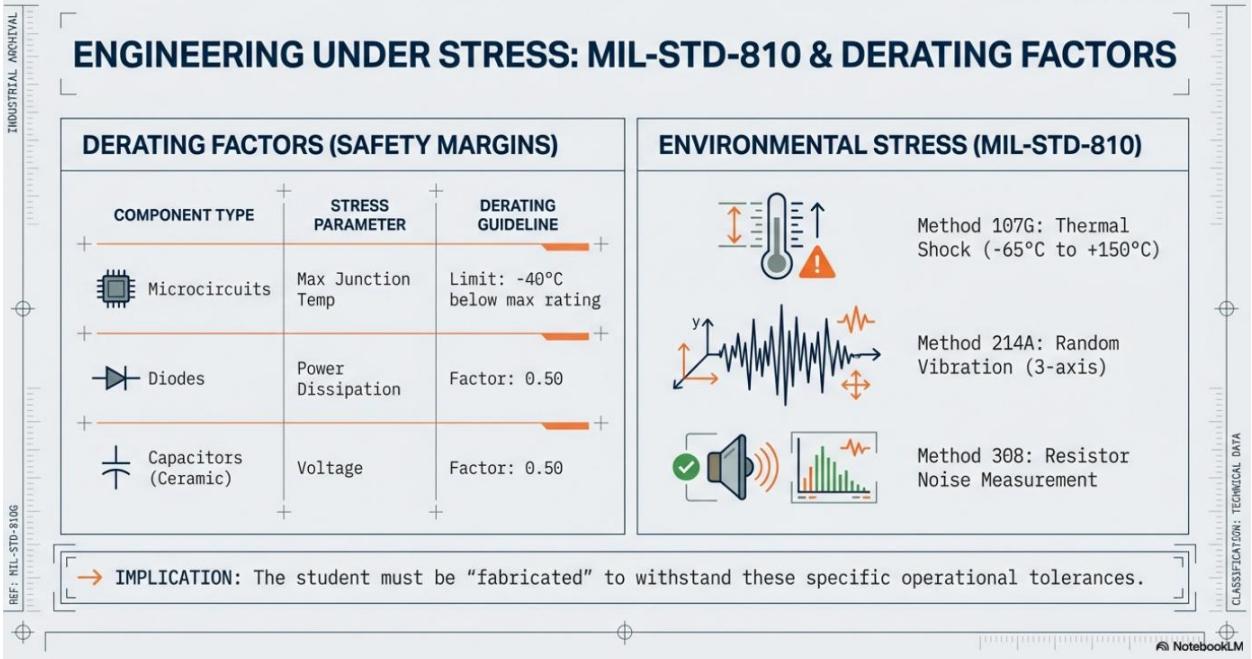
NotebookLM

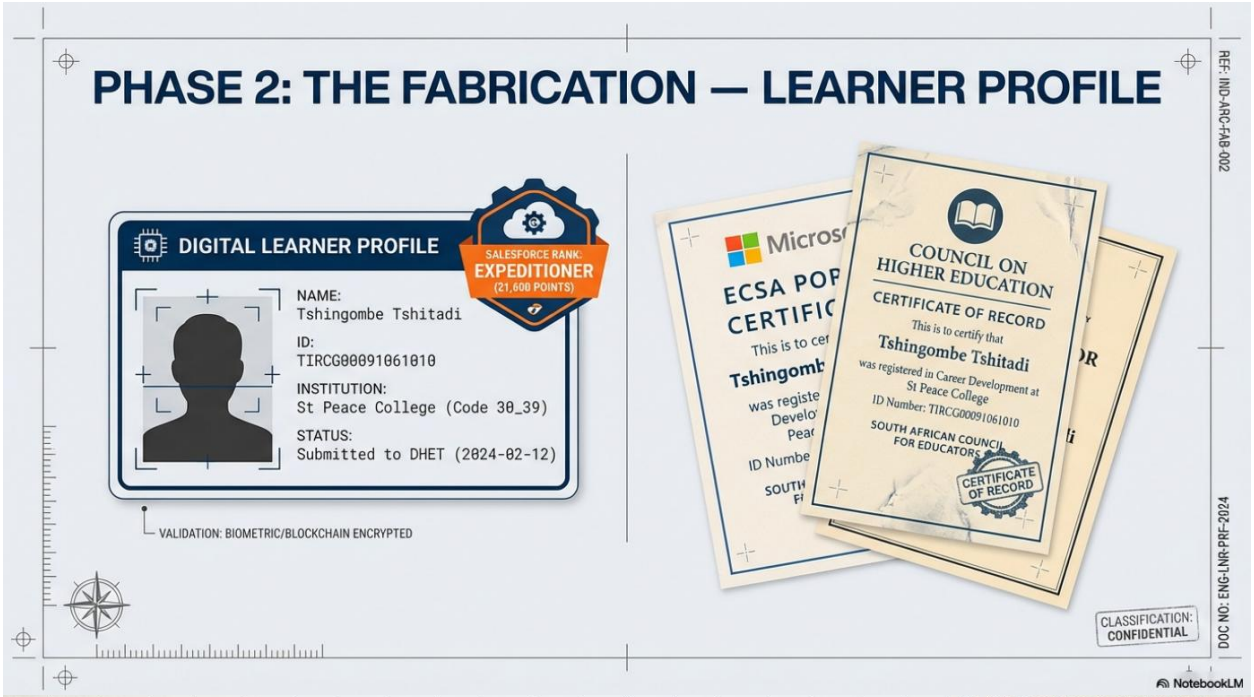

Engineering Excellence: The Qualification & Assessment Profile of
Tshingombe Tshitadi
SAQA
DHET
PROFESSIONAL IDENTITY & QUALIFICATION PATHWAY
NQF Level 6 (SAQA ID 90674)
involving N4-N6 certification and 24 months practical experience.
Verified SAQA Identifiers
Associated with SAQA Asset ID 09121 and institutional Code 30_39 for audit traceability.
09121
30_39
DHET Submission Status
Current record status marked as "Submitted" as of February 12, 2024.
National N in Engineering
ASSESSMENT POLICY & COGNITIVE WEIGHTING (IE099)
Test 1 (30% weight)
Test 2 (70% weight)
Test 2 (70% weight)
TEST
ICASS Trimester Weighting
(60%)
(20%)
(15%)
(5%)
Knowledge (60%)
Understanding (20%)
Application (15%)
Evaluation (5%)
Examination Cognitive Load
ELECTRICAL TRADE THEORY MODULE BREAKDOWN
30%
DC Theory Focus
Direct Current principles represent the largest theoretical weighting in the Electrical Trade module.
Promotion Requirements
A minimum pass of 40% is required for ICASS, Examinations, and overall promotion.
25%
Wiring Standards
Significant emphasis is placed on the wiring of premises and safety precautions.
Engineering Studies Subject Progression
N1 - N3
Mathematics
Engineering Science
Electrical Trade Theory
N4 - N5
Industrial Electronics
Electrotechnics
Power Machines
N6
Control Systems
Installation Rules
Specialised Electric Codes
CERTIFICATE SERIAL N
Verify Online
NotebookLM

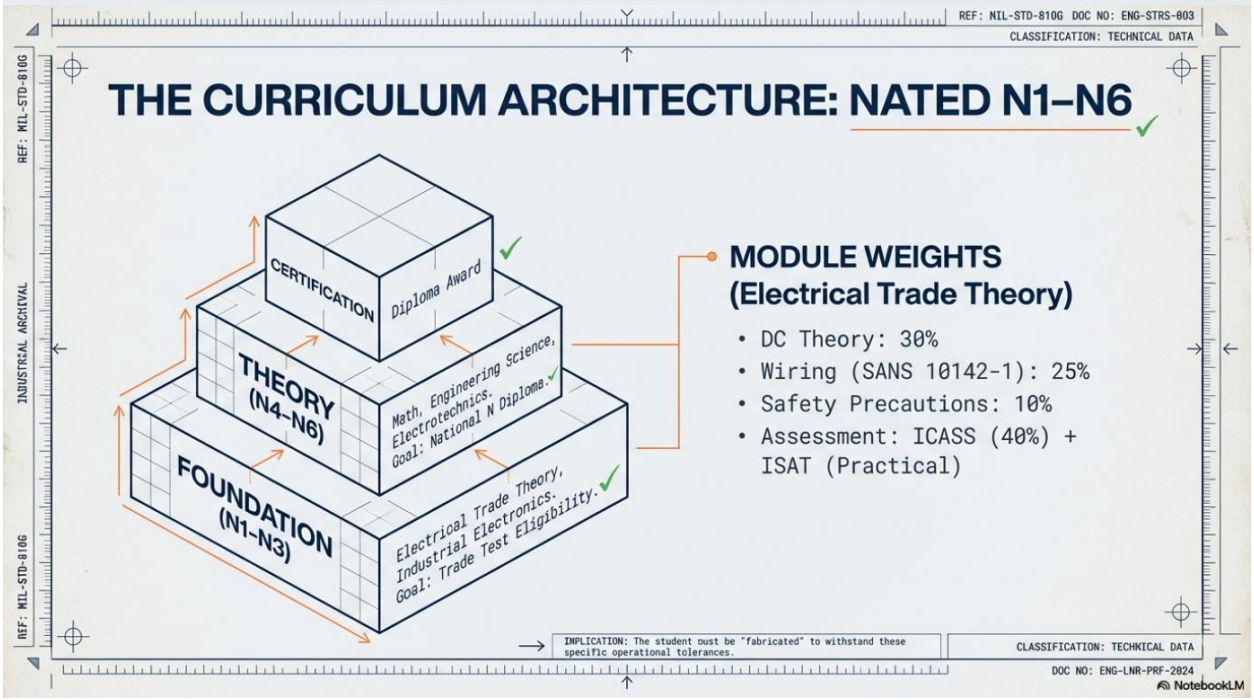

ENGINEERING COMPETENCE: FROM MILITARY STANDARD TO CERTIFIED PROFESSIONAL
A Lifecycle Analysis of Learner Tshingombe Tshitadi against MIL-STD-11991B, NATED Curricula, and SAQA Verification Protocols.
1. SPECIFICATION (MIL-STD)
Standardization, Requirements Definition, Compliance Criteria.
2. FABRICATION (NATED)
Technical Training, Curriculum Mastery, Practical Application.
CASE STUDY: TSHINGOMBE TSHITADI/ ST PEACE COLLEGE
4. RELEASE (CERTIFICATION)
Verification, Accreditation, Professional Recognition (SAQA).
3. STRESS TEST (FIELDWORK)
Real-World Deployment, Performance Evaluation, Data Acquisition.
VERIFIED DOCUMENT
ENGINEERING ARCHIVE
NotebookLM

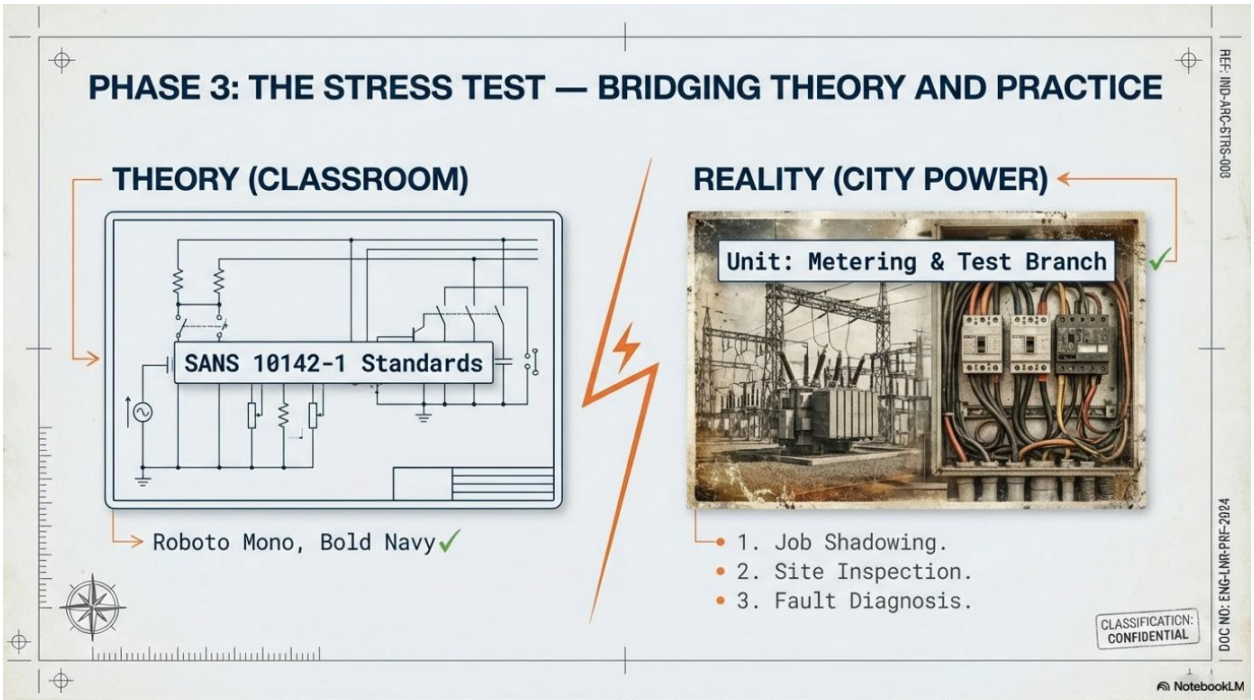

EXECUTIVE SUMMARY: THE ECOSYSTEM OF ENGINEERING EXCELLENCE
THE BENCHMARK
Source: MIL-STD-11991B & MIL-STD-810
Defining rigorous requirements for parts, materials, and processes (PM&P).
Focus: Audit Readiness & Reliability.
THE FABRICATION
Source: NATED N1–N6 & Trailhead
Theoretical architecture at St Peace College and digital upskilling via Salesforce.
Metric: Expeditioner Rank.
St Peace College
Salesforce
THE STRESS TEST
Source: City Power Field Visit
Application of theory in high-voltage environments.
Focus: Job Shadowing & Fault Diagnosis.
FAULT DIAGNOSIS
THE CREDENTIAL
Source: SAQA & DHET Protocols
Design of data-rich certificates serving as the final Certificate of Conformance.
CERTIFICATE OF CONFORMANCE
OBJECTIVE: SYNTHESIS OF TECHNICAL STANDARDS, ACADEMIC DATA, AND FIELD RESEARCH
NotebookLM

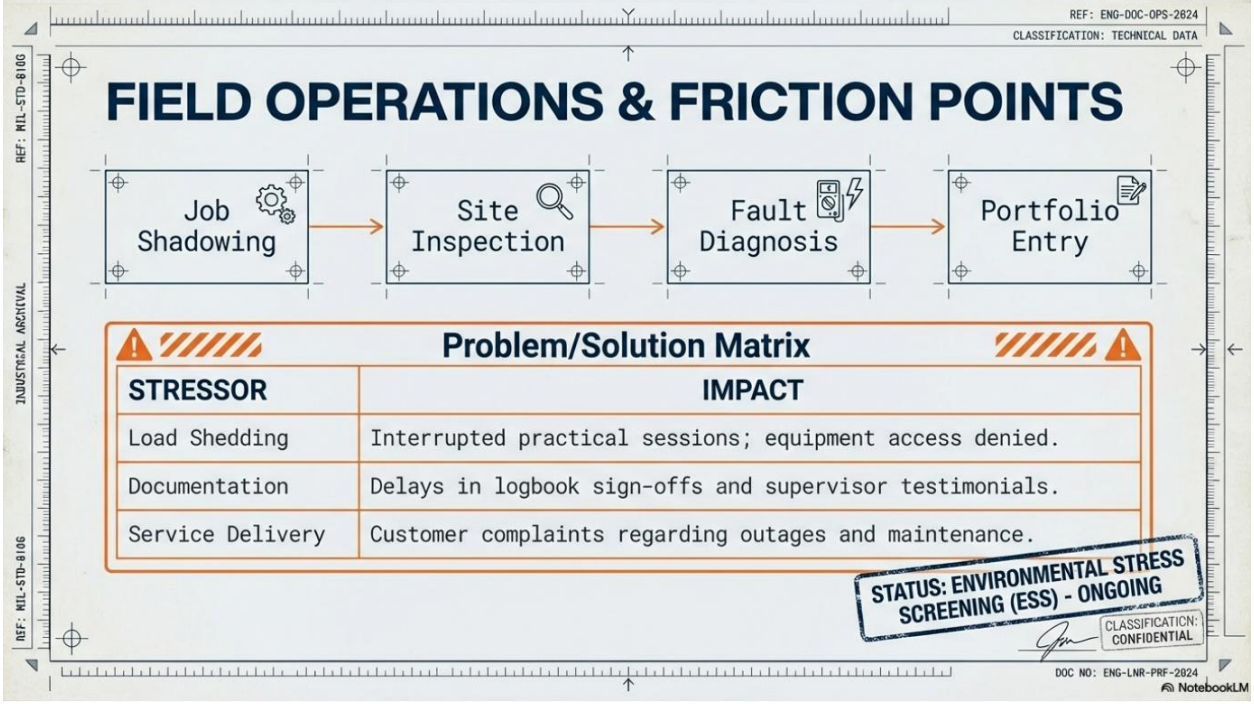

PHASE 1: THE SPECIFICATION — DEFINING RIGOR
Reference: MIL-STD-11991B - Parts, Materials, and Processes (PM&P).
INCOMING INSPECTION
Initial assessment against PM&P standards.
Data Req: Table 1 (Materials Bill of Lading & Test Reports).
AUTHENTICITY CHECK
Verification of origin and integrity.
Section 4.4.2 Counterfeit Prevention (Validation & Traceability).
CRITICAL: Authenticity must be traceable to OCM (Original Component Manufacturer). In this context: The Accredited Institution.
LIFE CYCLE MANAGEMENT
PM&P performance monitoring across stages.
Intro -> Growth -> Maturity -> Decline (Status & Obsolescence).
AUDIT TRAIL
Comprehensive documentation and record-keeping.
Output: Approved Supplier List (Maintained & Certified).
Verified & Stamped.
OBJECTIVE: ESTABLISH A FOUNDATION OF UNCOMPROMISING STANDARDS FOR ALL ENGINEERING MATERIALS.
NotebookLM
REF: MIL-STD-810G
DOC NO: ENG-STRS-003
CLASSIFICATION: TECHNICAL DATA

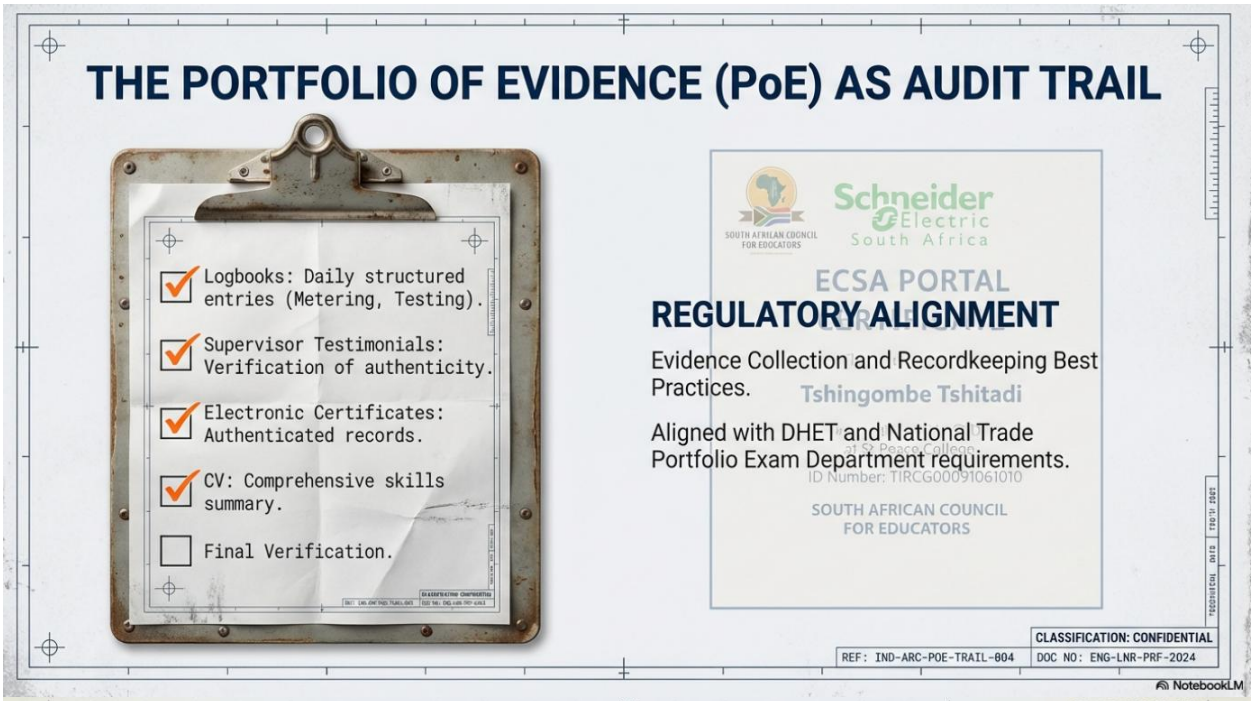

INDUSTRIAL ARCHIVAL
ENGINEERING UNDER STRESS: MIL-STD-810 & DERATING FACTORS
DERATING FACTORS (SAFETY MARGINS)
COMPONENT TYPE
STRESS PARAMETER
DERATING GUIDELINE
Microcircuits
Max Junction Temp
Limit: -40°C below max rating
Diodes
Power Dissipation
Factor: 0.50
Capacitors (Ceramic)
Voltage
Factor: 0.50
ENVIRONMENTAL STRESS (MIL-STD-810)
Method 107G: Thermal Shock (-65°C to +150°C)
Method 214A: Random Vibration (3-axis)
Method 308: Resistor Noise Measurement
IMPLICATION: The student must be "fabricated" to withstand these specific operational tolerances.
REF: MIL-STD-810G
CLASSIFICATION: TECHNICAL DATA
NotebookLM

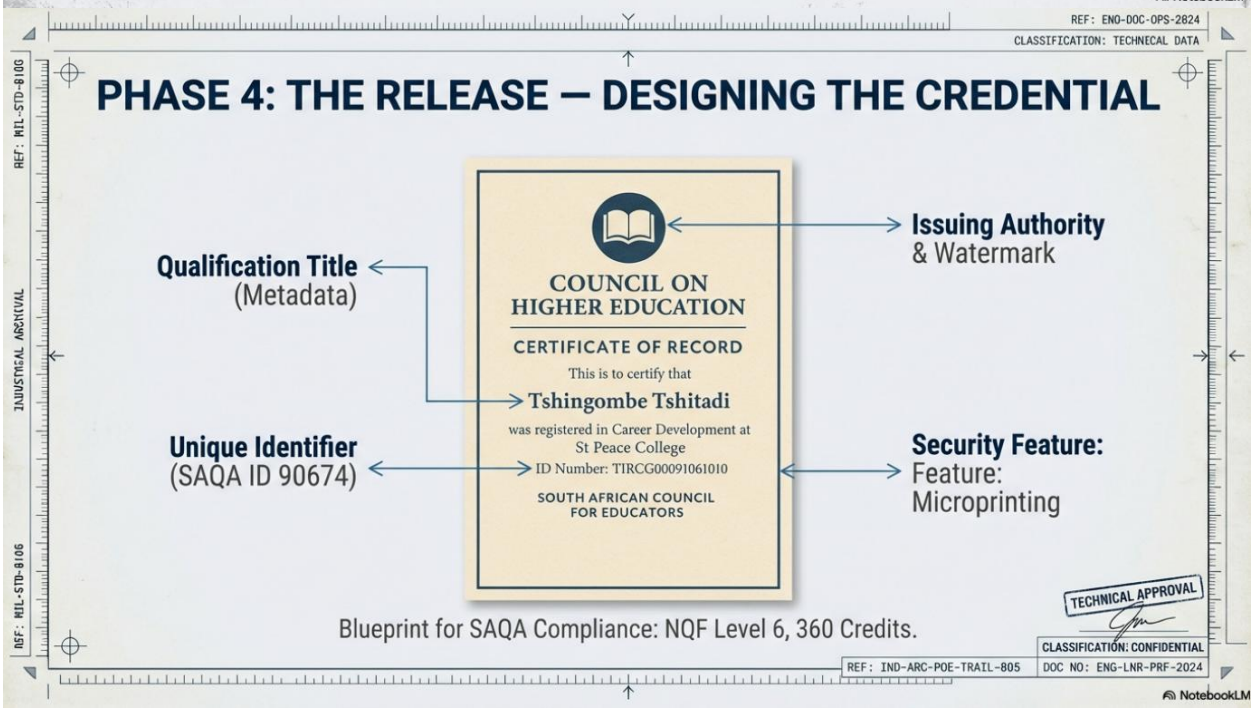

PHASE 2: THE FABRICATION — LEARNER PROFILE
DIGITAL LEARNER PROFILE
SALESFORCE RANK:
EXPEDITIONER
(21,600 POINTS)
NAME:
Tshingombe Tshitadi
ID:
TIRCG00091061010
INSTITUTION:
St Peace College (Code 30_39)
STATUS:
Submitted to DHET (2024-02-12)
VALIDATION: BIOMETRIC/BLOCKCHAIN ENCRYPTED
COUNCIL ON
HIGHER EDUCATION
CERTIFICATE OF RECORD
This is to certify that
Tshingombe Tshitadi
was registered in Career Development at
St Peace College
ID Number: TIRCG00091061010
SOUTH AFRICAN COUNCIL
FOR EDUCATORS
CERTIFICATE
OF RECORD
CLASSIFICATION:
CONFIDENTIAL
REF: IND-ARC-FAB-002
DOC NO: ENG-LNR-PRF-2024
NotebookLM

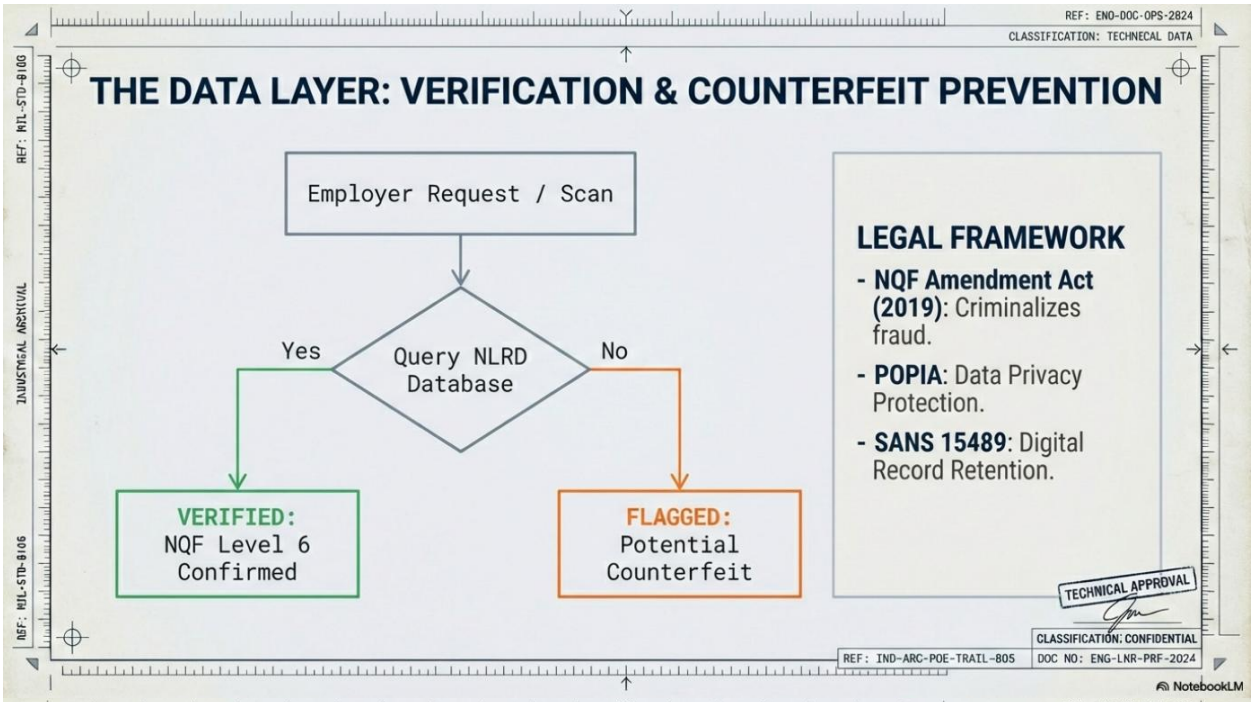

REF: NIL-STD-810G DOC NO: ENG-STRS-803
CLASSIFICATION: TECHNICAL DATA
REF: MIL-STD-810G
INDUSTRIAL ARCHIVAL
REF: MIL-STD-810G
THE CURRICULUM ARCHITECTURE: NATED N1–N6
CERTIFICATION
Diploma Award
THEORY
(N4–N6)
Math, Engineering Science, Electrotechnics.
Goal: National N Diploma.
FOUNDATION
(N1–N3)
Electrical Trade Theory, Industrial Electronics.
Goal: Trade Test Eligibility.
MODULE WEIGHTS
(Electrical Trade Theory)
• DC Theory: 30%
• Wiring (SANS 10142-1): 25%
• Safety Precautions: 10%
• Assessment: ICASS (40%) + ISAT (Practical)
IMPLICATION: The student must be "fabricated" to withstand these specific operational tolerances.
CLASSIFICATION: TECHNICAL DATA
DOC NO: ENG-LNR-PRF-2024
NotebookLM

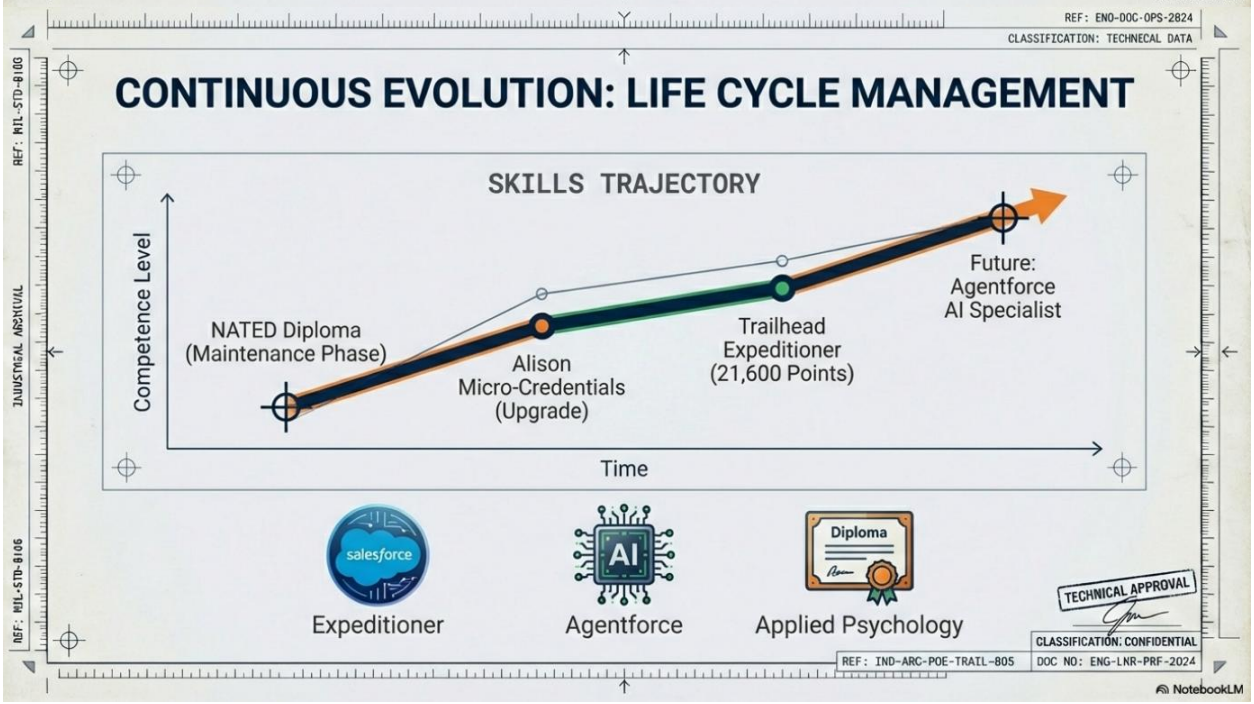

PHASE 3: THE STRESS TEST — BRIDGING THEORY AND PRACTICE
THEORY (CLASSROOM)
SANS 10142-1 Standards
Roboto Mono, Bold Navy
REALITY (CITY POWER)
Unit: Metering & Test Branch
1. Job Shadowing.
2. Site Inspection.
3. Fault Diagnosis.
CLASSIFICATION: CONFIDENTIAL
REF: IND-ARC-STRS-003
DOC NO: ENG-LNR-PRF-2024
NotebookLM

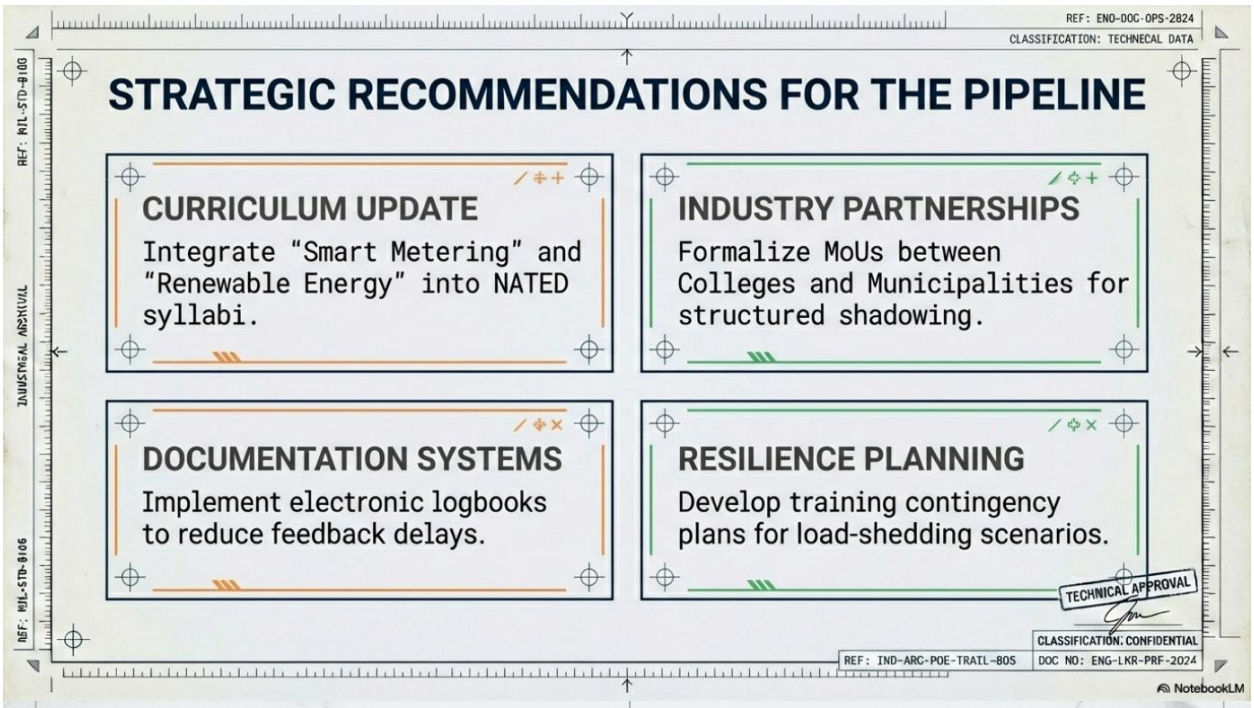

REF: ENG-DOC-OPS-2824
CLASSIFICATION: TECHNICAL DATA
FIELD OPERATIONS & FRICTION POINTS
Job Shadowing
Site Inspection
Fault Diagnosis
Portfolio Entry
Problem/Solution Matrix
STRESSOR
IMPACT
Load Shedding
Interrupted practical sessions; equipment access denied.
Documentation
Delays in logbook sign-offs and supervisor testimonials.
Service Delivery
Customer complaints regarding outages and maintenance.
STATUS: ENVIRONMENTAL STRESS SCREENING (ESS) - ONGOING
CLASSIFICATION: CONFIDENTIAL
DOC NO: ENG-LNR-PRF-2024
NotebookLM

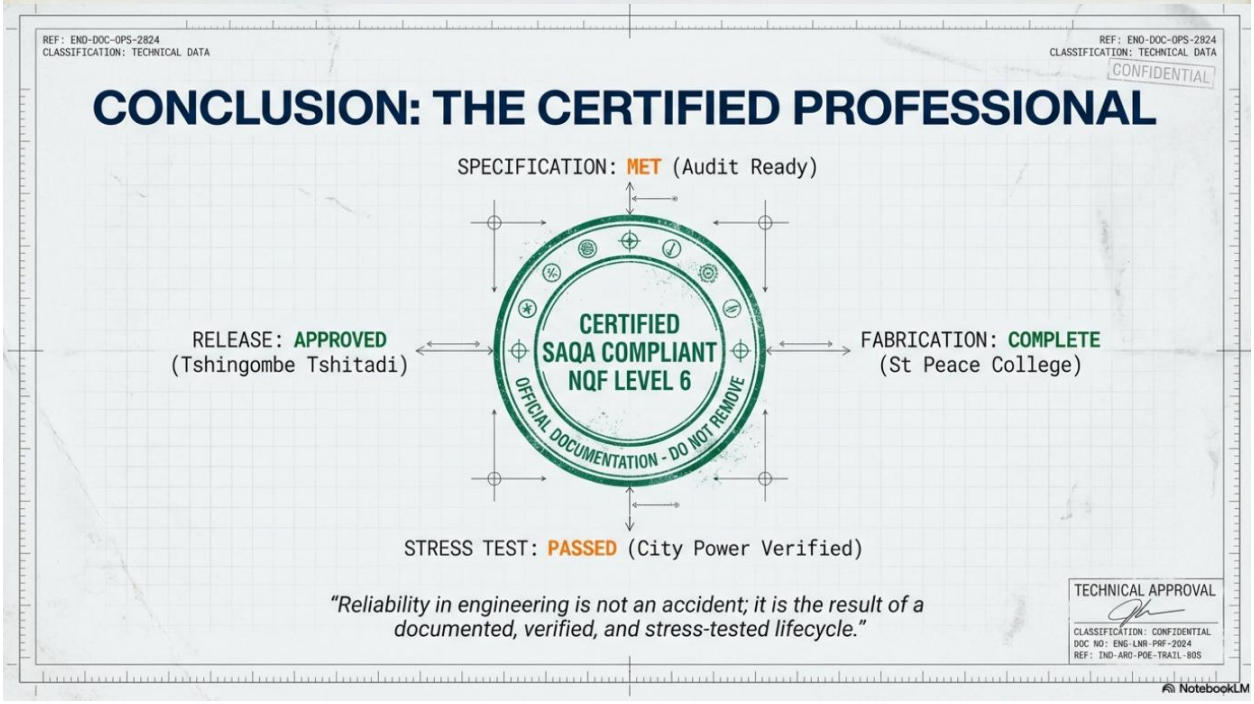

THE PORTFOLIO OF EVIDENCE (PoE) AS AUDIT TRAIL
Logbooks: Daily structured entries (Metering, Testing).
Supervisor Testimonials: Verification of authenticity.
Electronic Certificates: Authenticated records.
CV: Comprehensive skills summary.
Final Verification.
REGULATORY ALIGNMENT
Evidence Collection and Recordkeeping Best Practices.
Aligned with DHET and National Trade Portfolio Exam Department requirements.
CLASSIFICATION: CONFIDENTIAL
REF: IND-ARC-POE-TRAIL-804
DOC NO: ENG-LNR-PRF-2024
NotebookLM


REF: ENG-DOC-OPS-2824
CLASSIFICATION: TECHNECAL DATA
PHASE 4: THE RELEASE — DESIGNING THE CREDENTIAL
Qualification Title (Metadata)
Issuing Authority & Watermark
Unique Identifier (SAQA ID 90674)
Security Feature: Feature: Microprinting
COUNCIL ON HIGHER EDUCATION
CERTIFICATE OF RECORD
This is to certify that
Tshingombe Tshitadi
was registered in Career Development at St Peace College
ID Number: TIRCG00091061010
SOUTH AFRICAN COUNCIL FOR EDUCATORS
TECHNICAL APPROVAL
Blueprint for SAQA Compliance: NQF Level 6, 360 Credits.
CLASSIFICATION: CONFIDENTIAL
REF: IND-ARC-POE-TRAIL-805
DOC NO: ENG-LNR-PRF-2024
NotebookLM


REF: ENO-DOC-OPS-2824
CLASSIFICATION: TECHNECAL DATA
THE DATA LAYER: VERIFICATION & COUNTERFEIT PREVENTION
Employer Request / Scan
Query NLRD Database
Yes
No
VERIFIED: NQF Level 6 Confirmed
FLAGGED: Potential Counterfeit
LEGAL FRAMEWORK
- NQF Amendment Act (2019): Criminalizes fraud.
- POPIA: Data Privacy Protection.
- SANS 15489: Digital Record Retention.
TECHNICAL APPROVAL
CLASSIFICATION: CONFIDENTIAL
REF: IND-ARC-POE-TRAIL-805
DOC NO: ENG-LNR-PRF-2024
NotebookLM


REF: ENO-DOC-OPS-2824
CLASSIFICATION: TECHNECAL DATA
CONTINUOUS EVOLUTION: LIFE CYCLE MANAGEMENT
SKILLS TRAJECTORY
Competence Level
Time
NATED Diploma (Maintenance Phase)
Alison Micro-Credentials (Upgrade)
Trailhead Expeditioner (21,600 Points)
Future: Agentforce AI Specialist
Expeditioner
Agentforce
Applied Psychology
TECHNICAL APPROVAL
CLASSIFICATION: CONFIDENTIAL
REF: IND-ARC-POE-TRAIL-805
DOC NO: ENG-LNR-PRF-2024
NotebookLM


REF: ENG-DOC-OPS-2824
CLASSIFICATION: TECHNECAL DATA
REF: MIL-STD-9100
INDUSTRIAL ARCHIVAL
REF: MIL-STD-9106
STRATEGIC RECOMMENDATIONS FOR THE PIPELINE
CURRICULUM UPDATE
Integrate "Smart Metering" and "Renewable Energy" into NATED syllabi.
INDUSTRY PARTNERSHIPS
Formalize MoUs between Colleges and Municipalities for structured shadowing.
DOCUMENTATION SYSTEMS
Implement electronic logbooks to reduce feedback delays.
RESILIENCE PLANNING
Develop training contingency plans for load-shedding scenarios.
TECHNICAL APPROVAL
CLASSIFICATION: CONFIDENTIAL
REF: IND-ARC-POE-TRAIL-805
DOC NO: ENG-LKR-PRF-2024
NotebookLM


REF: END-DOC-OPS-2824
CLASSIFICATION: TECHNICAL DATA
REF: END-DOC-OPS-2824
CLASSIFICATION: TECHNICAL DATA
CONFIDENTIAL
CONCLUSION: THE CERTIFIED PROFESSIONAL
SPECIFICATION: MET (Audit Ready)
RELEASE: APPROVED
(Tshingombe Tshitadi)
CERTIFIED
SAQA COMPLIANT
NQF LEVEL 6
OFFICIAL DOCUMENTATION - DO NOT REMOVE
FABRICATION: COMPLETE
(St Peace College)
STRESS TEST: PASSED (City Power Verified)
"Reliability in engineering is not an accident; it is the result of a documented, verified, and stress-tested lifecycle."
TECHNICAL APPROVAL
CLASSIFICATION: CONFIDENTIAL
DOC NO: ENG-LNR-PRF-2024
REF: IND-ARO-POE-TRAIL-805
NotebookLM

REF: ENO-DOC-OPS-2824
CLASSIFICATION: TECHNECAL DATA

REFERENCES & SOURCES

- MIL-STD-11991B: Parts, Materials, and Processes.
- MIL-STD-810: Environmental Engineering Considerations.
- Department of Higher Education & Training (DHET) Transcripts.
- SAQA Policy for Registration of Qualifications.
- City Power Johannesburg: Operational Report.
- Salesforce Trailhead Learner Profile: Tshingombe Tshitadi.

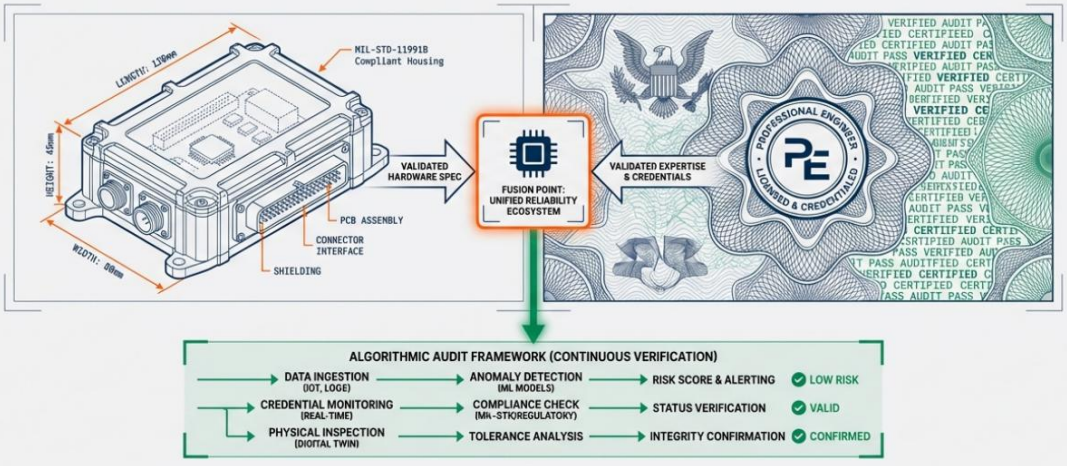
Presentation Design by [AI Model Name] / 2024

TECHNICAL APPROVAL
CLASSEFICATION: CONFIDEWTIAL
DOC NO: ENG-LNR P9F-2024
REF: IND-ARD-POE-TRJL-80S

NotebookLM

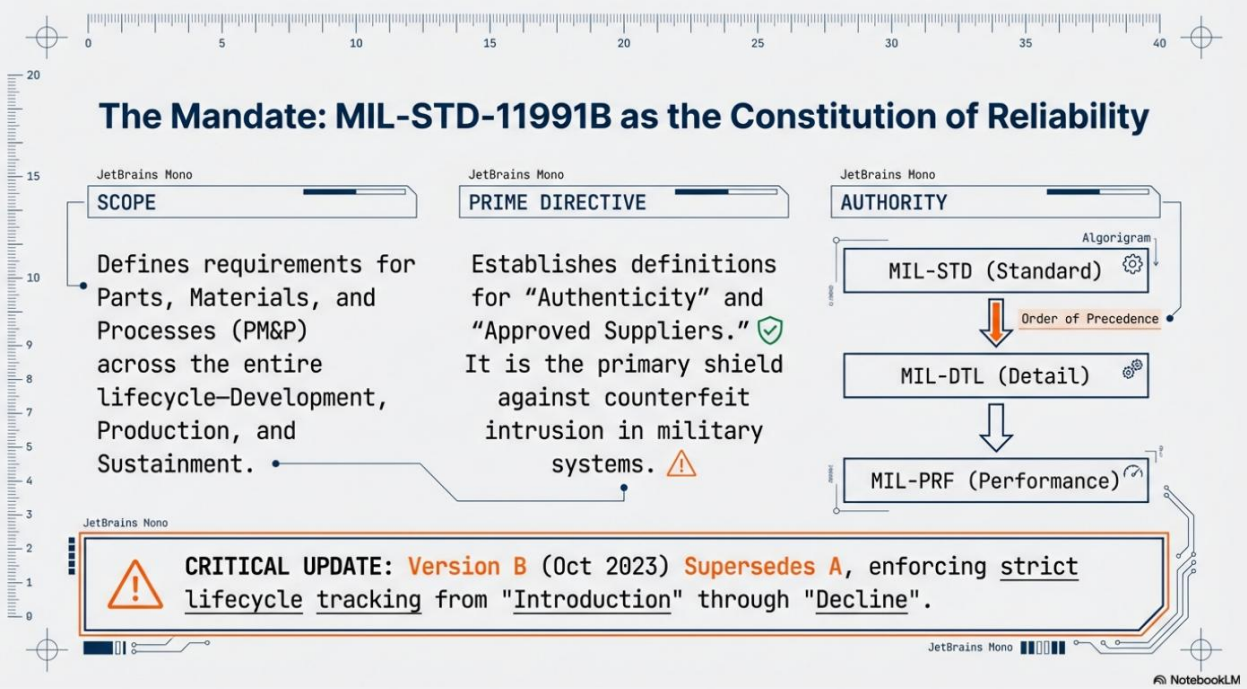
Engineering Integrity: Synthesizing Standards, Competency, and Verification

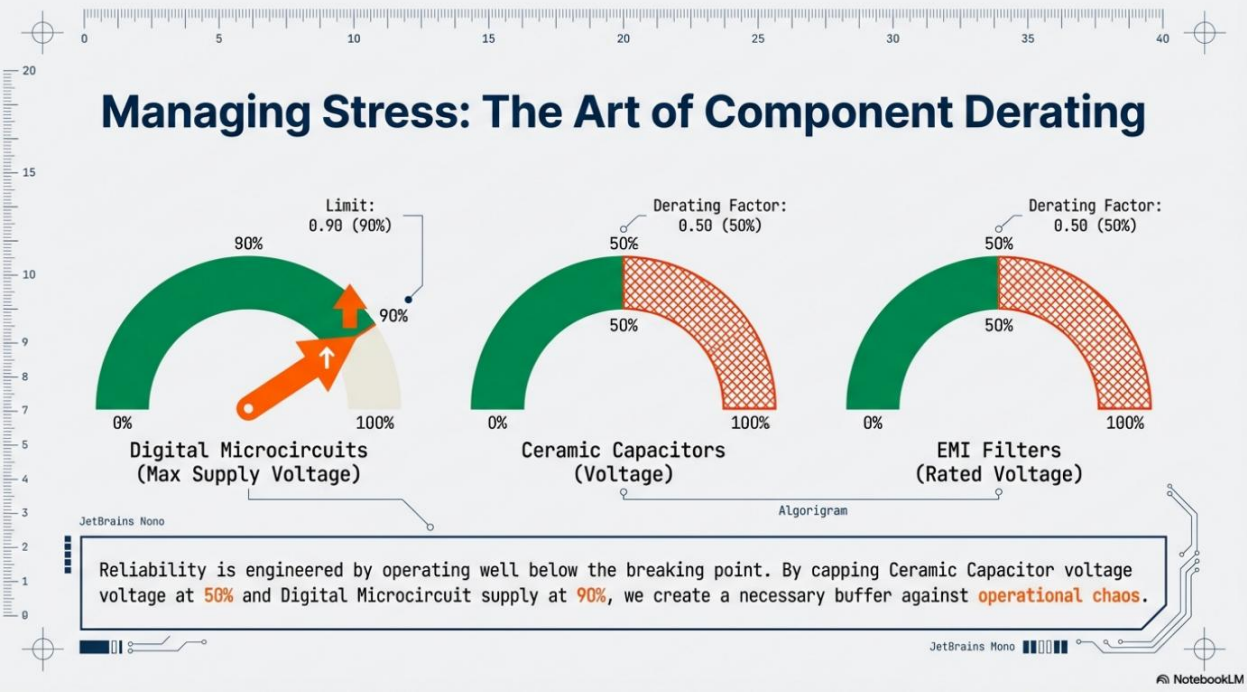
A Strategic Overview of MIL-STD-11991B, Professional Credentialing, **and Audit Methodologies.**



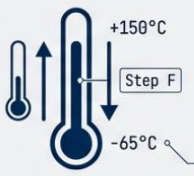
Core Thesis: Reliability requires a unified ecosystem where validated hardware meets validated expertise managed by algorithmic auditing.

NotebookLM


The Mandate: MIL-STD-11991B as the Constitution of Reliability
JetBrains Mono
SCOPE
Defines requirements for Parts, Materials, and Processes (PM&P) across the entire lifecycle—Development, Production, and Sustainment.
JetBrains Mono
PRIME DIRECTIVE
Establishes definitions for "Authenticity" and "Approved Suppliers." It is the primary shield against counterfeit intrusion in military systems.
JetBrains Mono
AUTHORITY
Algorigram
MIL-STD (Standard)
Order of Precedence
MIL-DTL (Detail)
MIL-PRF (Performance)
JetBrains Mono
CRITICAL UPDATE: Version B (Oct 2023) Supersedes A, enforcing strict lifecycle tracking from "Introduction" through "Decline".
JetBrains Mono
NotebookLM


Managing Stress: The Art of Component Derating
Limit:
0.90 (90%)
90%
90%
0%
100%
Digital Microcircuits
(Max Supply Voltage)
Derating Factor:
0.50 (50%)
50%
50%
0%
100%
Ceramic Capacitors
(Voltage)
Derating Factor:
0.50 (50%)
50%
50%
0%
100%
EMI Filters
(Rated Voltage)
Algorigram
JetBrains Nono
Reliability is engineered by operating well below the breaking point. By capping Ceramic Capacitor voltage voltage at 50% and Digital Microcircuit supply at 90%, we create a necessary buffer against operational chaos.
JetBrains Mono
NotebookLM

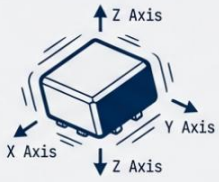
The Crucible: Environmental Testing and Verification



Method 107G: Thermal Shock

Rapid cycling -65°C to +150°C (Step F).

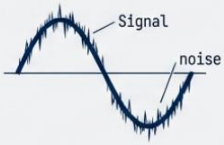
Fluids: FC77 / FC70.



Method 214A: Random Vibration

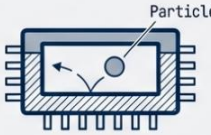
Structural integrity across 3 axes.

Duration: Up to 8 hours.



Method 308: Resistor Noise

Measuring current-noise voltage to ensure signal clarity.



Method 217A: PIND

Particle Impact Noise Detection.

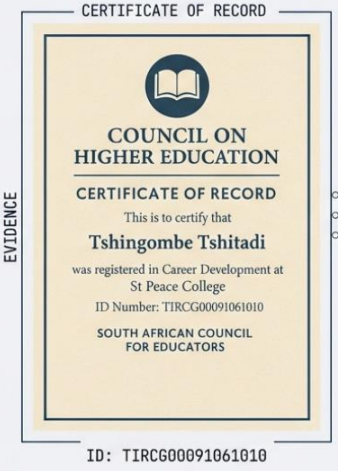
Identifying loose internal particles in sealed cavities.

Survival is binary. Components either ✅ pass the specified "Condition Letter" or they are ⚠ rejected.

JetBrains Mono

NotebookLM

The Competency Matrix: NATED Education & Training



Cross-Walk

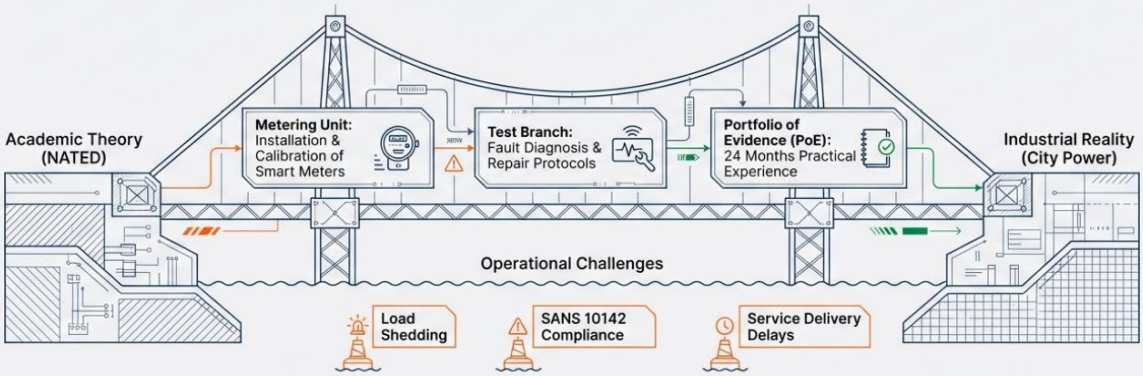
Academic Module	Engineering Reality
Electrical Trade Theory N1-N2	Wiring Standards (SANS 10142) & Conductor properties.
Engineering Science N4	Understanding stress/strain for Vibration Testing (Method 214A).
Logic Systems	Understanding Digital Electronics and Microcircuit Derating.

Profile: Tshingombe Tshitadi – Engineering Student & Assessment Moderator.
Qualification: National N Diploma Engineering (SAQA ID 90674 / NQF Level 6).

JetBrains Mono

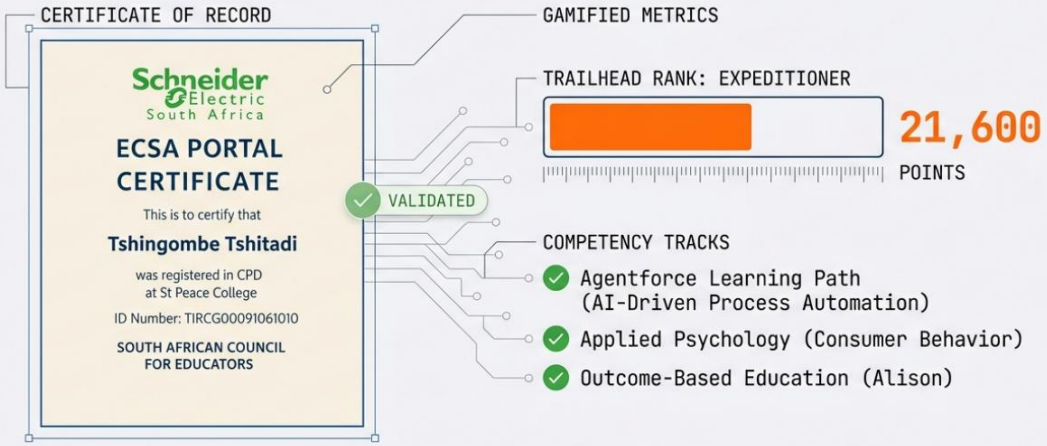
NotebookLM

Bridging Theory and Practice: The City Power Case Study



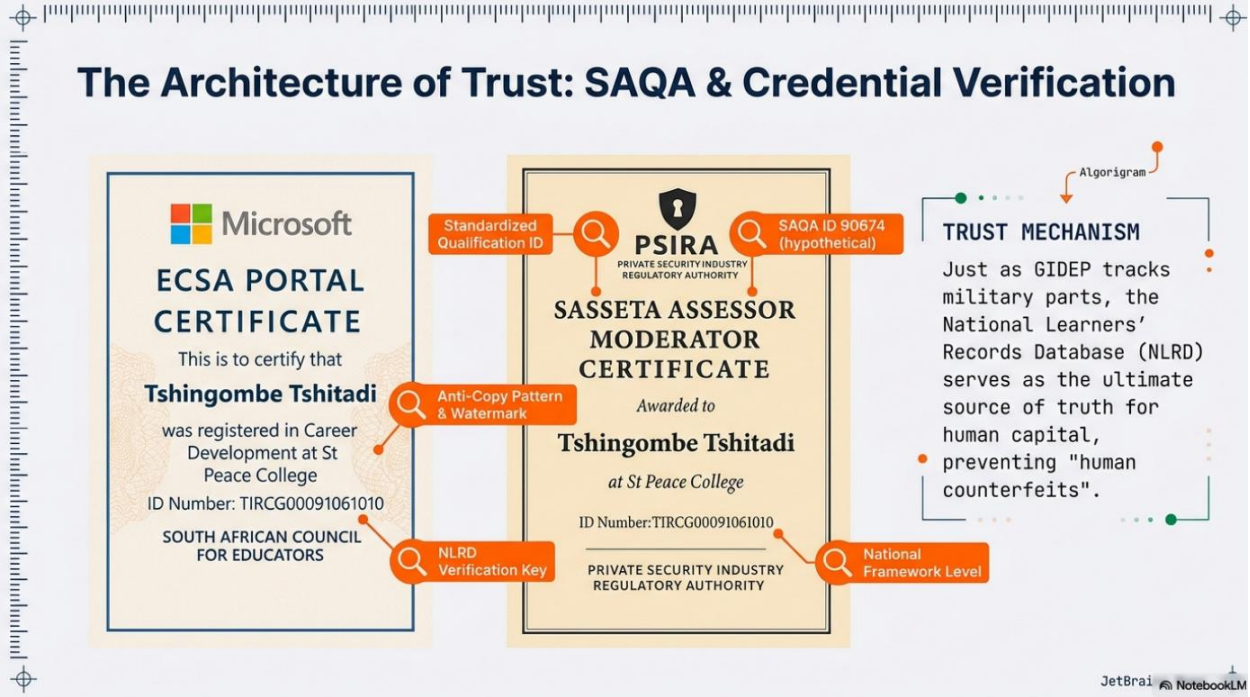
The City Power visit validates NATED curricula against real-world municipal utility operations, fulfilling the PoE requirement for the National N Diploma.

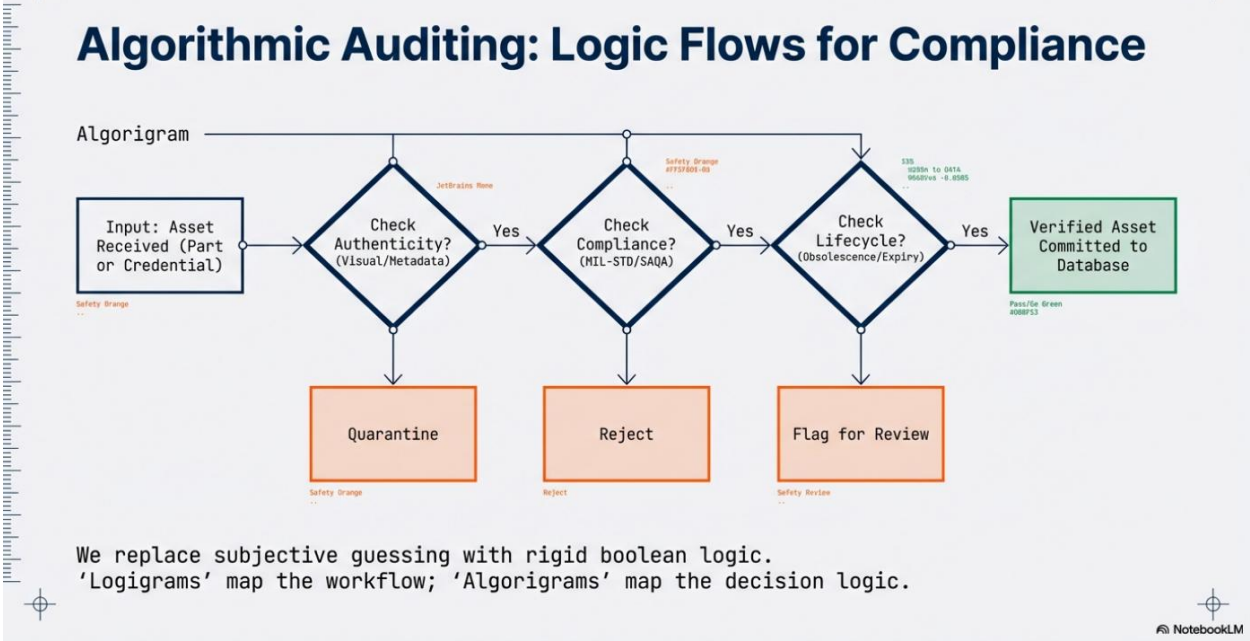
Future-Readiness: Continuous Professional Development

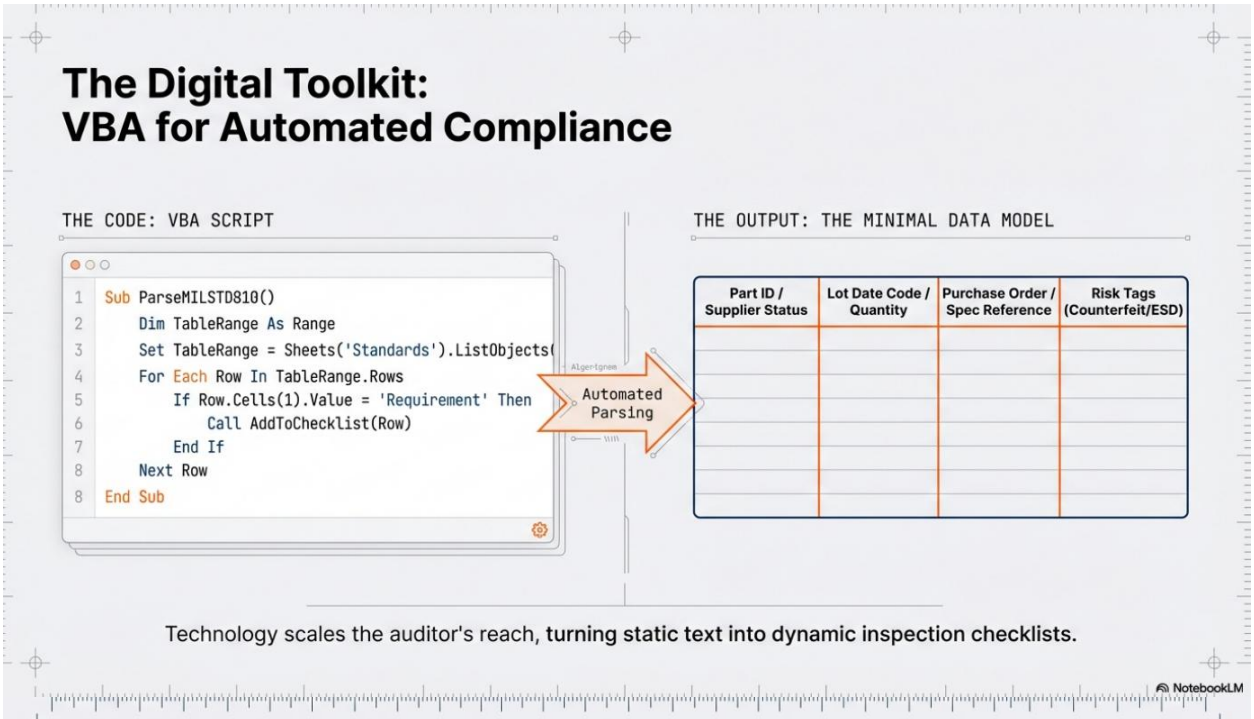


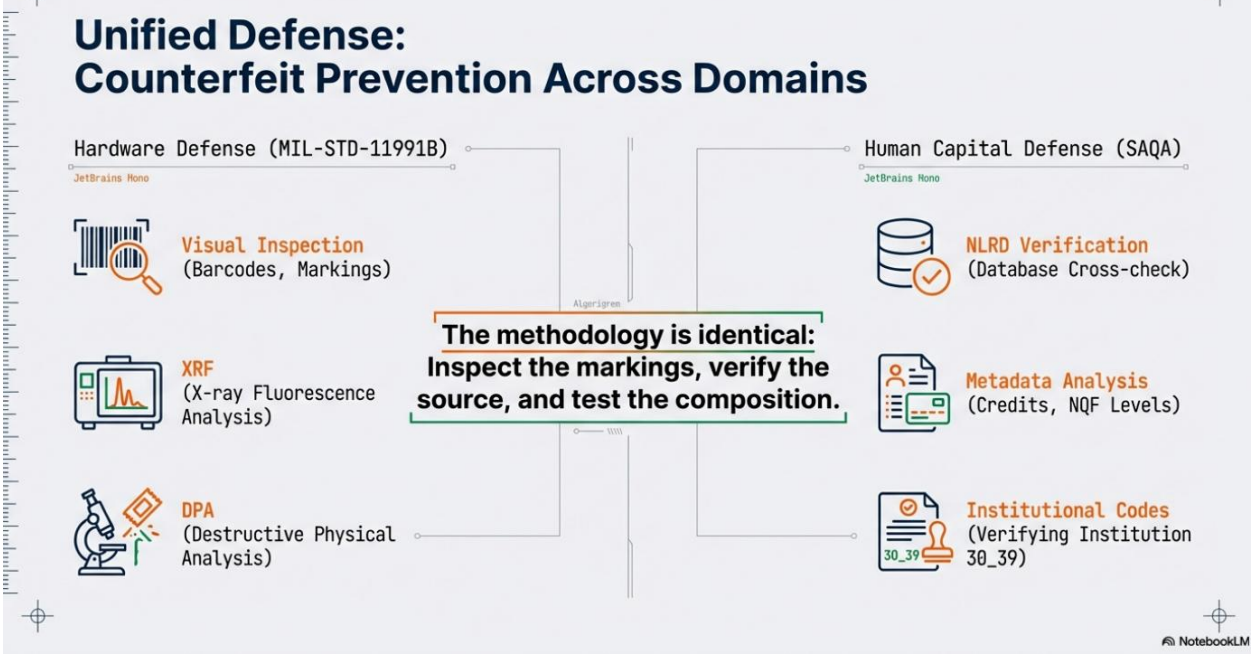
The modern engineer combines technical electrical theory with AI automation skills and psychological insight for user-centric design.

JetBrains Mono
NotebookLM

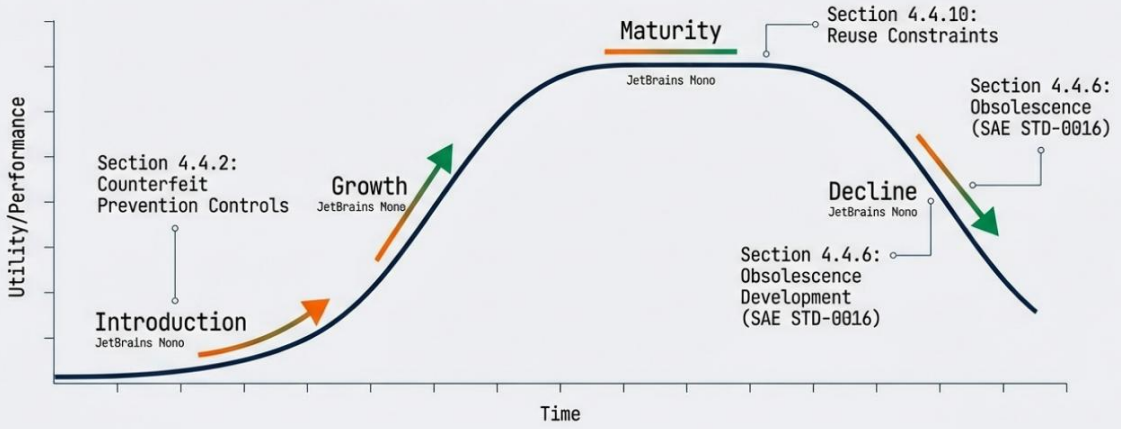

The Architecture of Trust: SAQA & Credential Verification
Microsoft
ECSA PORTAL CERTIFICATE
This is to certify that
Tshingombe Tshitadi
was registered in Career Development at St Peace College
ID Number: TIRCG00091061010
SOUTH AFRICAN COUNCIL FOR EDUCATORS
Anti-Copy Pattern & Watermark
NLRD Verification Key
Standardized Qualification ID
SAQA ID 90674 (hypothetical)
PSIRA
PRIVATE SECURITY INDUSTRY REGULATORY AUTHORITY
SASSETA ASSESSOR MODERATOR CERTIFICATE
Awarded to
Tshingombe Tshitadi
at St Peace College
ID Number:TIRCG00091061010
PRIVATE SECURITY INDUSTRY REGULATORY AUTHORITY
National Framework Level
Algorigram
TRUST MECHANISM
Just as GIDEP tracks military parts, the National Learners' Records Database (NLRD) serves as the ultimate source of truth for human capital, preventing "human counterfeits".
JetBrai
NotebookLM


Algorithmic Auditing: Logic Flows for Compliance
Algorigram
Input: Asset Received (Part or Credential)
Check Authenticity? (Visual/Metadata)
Yes
Check Compliance? (MIL-STD/SAQA)
Yes
Check Lifecycle? (Obsolescence/Expiry)
Yes
Verified Asset Committed to Database
Quarantine
Reject
Flag for Review
We replace subjective guessing with rigid boolean logic.
'Logigrams' map the workflow; 'Algorigrams' map the decision logic.
NotebookLM


The Digital Toolkit:
VBA for Automated Compliance
THE CODE: VBA SCRIPT
Sub ParseMILSTD810()
Dim TableRange As Range
Set TableRange = Sheets('Standards').ListObjects(
For Each Row In TableRange.Rows
If Row.Cells(1).Value = 'Requirement' Then
Call AddToChecklist(Row)
End If
Next Row
End Sub
Automated Parsing
THE OUTPUT: THE MINIMAL DATA MODEL
Part ID / Supplier Status
Lot Date Code / Quantity
Purchase Order / Spec Reference
Risk Tags (Counterfeit/ESD)
Technology scales the auditor's reach, turning static text into dynamic inspection checklists.
NotebookLM


Unified Defense:
Counterfeit Prevention Across Domains
Hardware Defense (MIL-STD-11991B)
Visual Inspection
(Barcodes, Markings)
XRF
(X-ray Fluorescence Analysis)
DPA
(Destructive Physical Analysis)
The methodology is identical:
Inspect the markings, verify the source, and test the composition.
Human Capital Defense (SAQA)
NLRD Verification
(Database Cross-check)
Metadata Analysis
(Credits, NQF Levels)
Institutional Codes
(Verifying Institution 30_39)
30_39
NotebookLM

Lifecycle Management: From Acquisition to Obsolescence



We must anticipate the "Decline" phase for components (Obsolescence) and Professionals (Skill gaps) and plan for **renewal**.

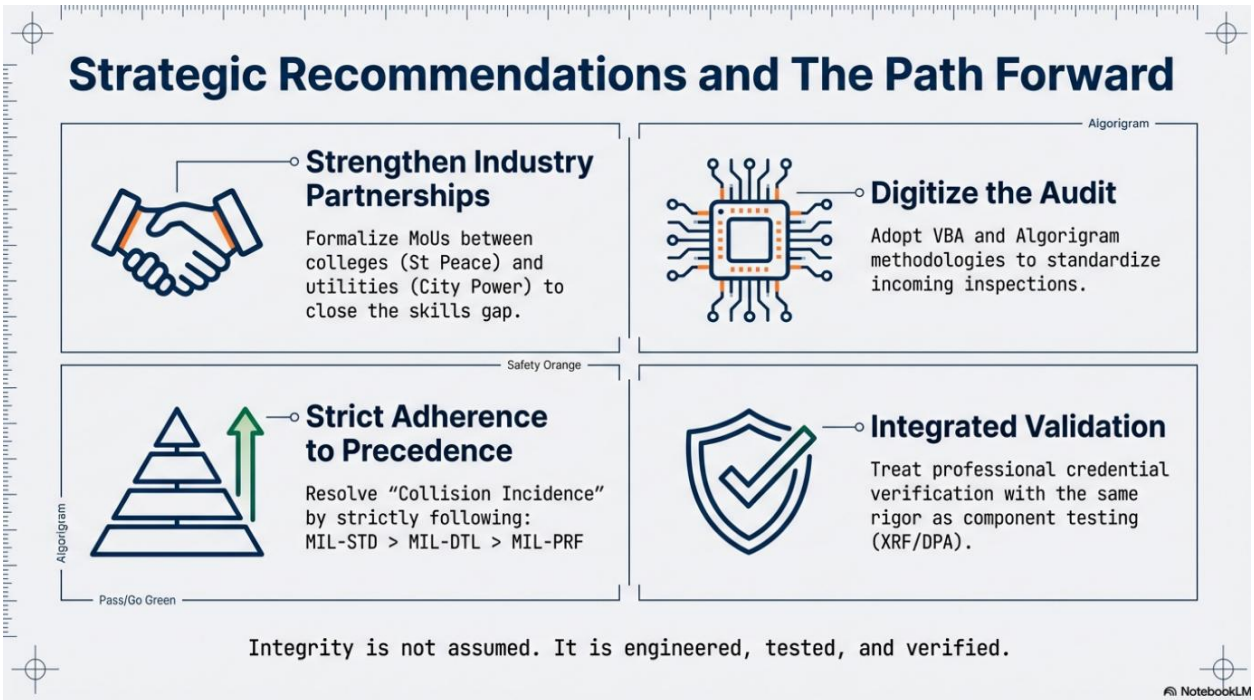
NotebookLM

Summary of Requirements: The Incoming Inspection Checklist

- [ ] **Database Fields:** Maintained for life of program (Lot date code, PO requirements). — Data Annotation
- [ ] **Procedures:** Documented sampling methods and acceptance criteria. — AQL Levels ISO 2859
- [ ] **NDT (Non-Destructive Testing):** X-ray (Radiological) for internal defects. — Detects bond wire/die attach issues
- [ ] **NDT (Non-Destructive Testing):** Eddy Current for coating thickness. — Measures plating/coating integrity
- [ ] **Certificate of Conformance (C of C):** Must include FTIR/XRF test data. — Verify material composition
- [ ] **Visual Inspection:** Check for remarking/resurfacing (Blacktopping). — Scrutinize surface texture and markings

AUDIT READY
VALIDATED

NotebookLM


Strategic Recommendations and The Path Forward
Strengthen Industry Partnerships
Formalize MoUs between colleges (St Peace) and utilities (City Power) to close the skills gap.
Algorigram
Digitize the Audit
Adopt VBA and Algorigram methodologies to standardize incoming inspections.
Safety Orange
Strict Adherence to Precedence
Resolve "Collision Incidence" by strictly following: MIL-STD > MIL-DTL > MIL-PRF
Algorigram
Pass/Go Green
Integrated Validation
Treat professional credential verification with the same rigor as component testing (XRF/DPA).
Integrity is not assumed. It is engineered, tested, and verified.
NotebookLM

UNCLASSIFIED // ENGINEERING REPORT
SYSTEM QUALIFICATION REPORT
REVISION B
Subject Configuration
NOMENCLATURE: TSHINGOMBE TSHITADI
SYSTEM CLASS: ENGINEERING, EDUCATION, & DIGITAL TRANSFORMATION
COMPLIANCE STANDARD: MIL-STD-11991B / SAQA NQF 6
ASSET ID: 09121
INSTITUTION CODE: 30_39
DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.
AUDIT STATUS: INITIATED
NotebookLM

SECTION 1.0: SCOPE & APPLICABILITY

TECHNICAL DATA: DISTRIBUTION STATEMENT A

01. SCOPE DEFINITION

This report qualifies the operational readiness of the Tshitadi System across three critical domains: Electrical Engineering (NATED N1-N6), Educational Quality Assurance (Moderation/Assessment), and Digital Architecture (Salesforce/AI).

TECHNICAL DATA: DISTRIBUTION STATEMENT A

02. CONFIGURATION BASELINE

- **HARDWARE:** National N Diploma Engineering (SAQA ID 90674)
- **SOFTWARE:** Salesforce Expeditioner Rank (21,600 Points)
- **GOVERNANCE:** SACE & ECSA Registered (ID: TIRCG00091061010)

03. VERIFIED ARTIFACTS

COUNCIL ON HIGHER EDUCATION
CERTIFICATE OF RECORD
This is to certify that
Tshingombe Tshitadi
was registered in Career Development at St Peace College
ID Number: TIRCG00091061010
SOUTH AFRICAN COUNCIL FOR EDUCATORS
Microsoft
ECSA PORTAL CERTIFICATE
This is to certify that
Tshingombe Tshitadi
was registered in Career Development at St Peace College
ID Number: TIRCG00091061010
SOUTH AFRICAN COUNCIL FOR EDUCATORS

FIG 1.1: COMPONENT VERIFICATION

KEY DEFINITIONS: OPERATIONAL COMPETENCY (CITY POWER) // AUTHENTICITY (DHET SYNTHESIS) // RELIABILITY (POLICY IE099)

NotebookLM

CONFIGURATION MANAGEMENT: ACADEMIC TRACEABILITY

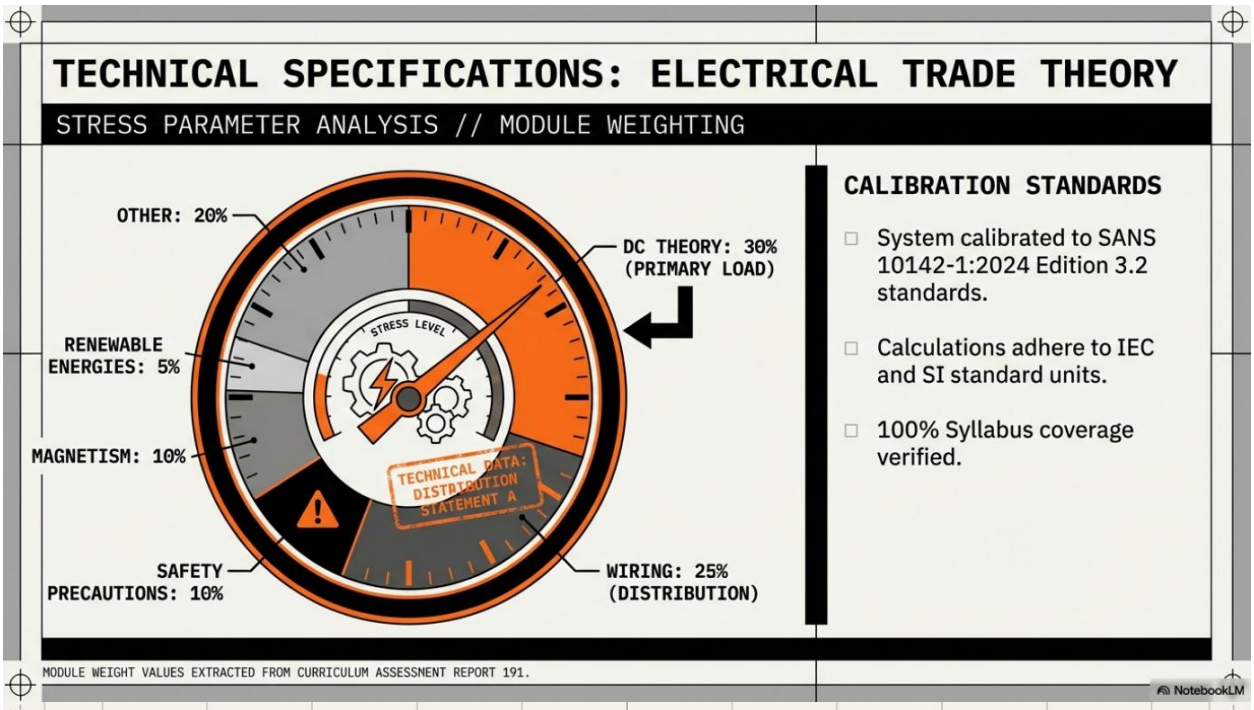
PART IDENTIFICATION MATRIX // REF: DHET TRANSCRIPT

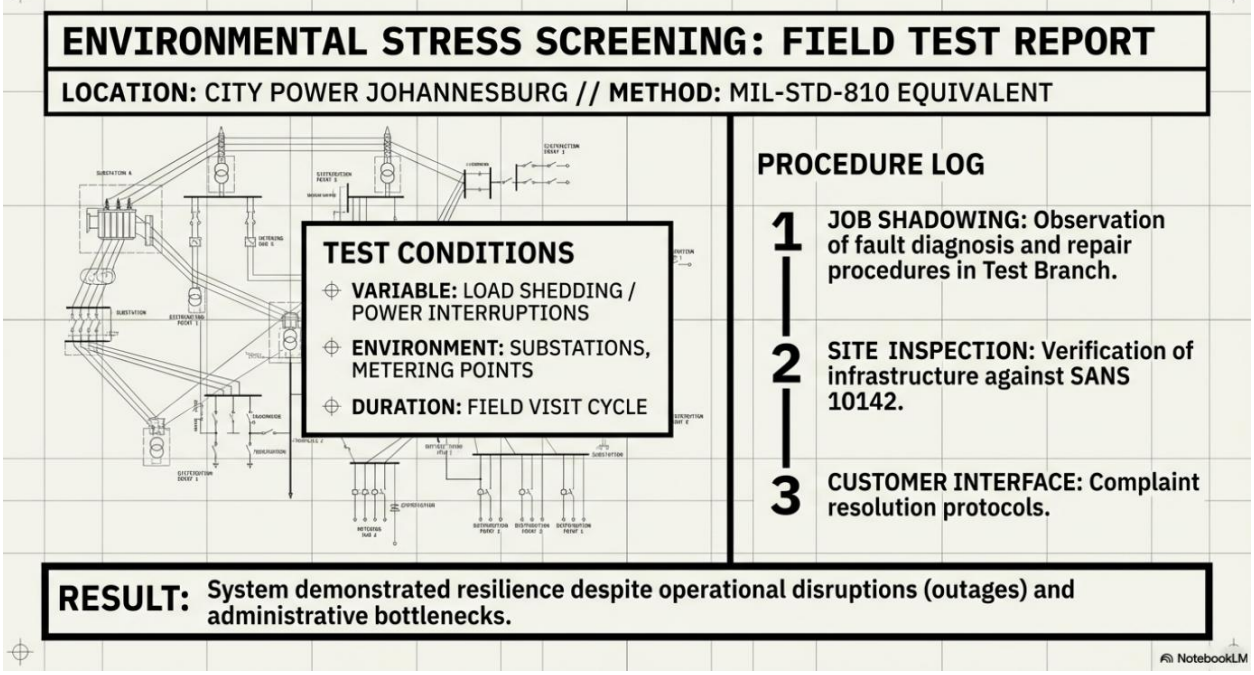
PART NAME	PART NUMBER (SAQA ID)	SPEC LEVEL	SUB-COMPONENTS
National N Diploma Engineering	**90674**	NQF LEVEL 6	**N4, N5, N6 CERTIFICATES** COMPONENT QUALIFIED
N4 Certificate	N/A	NQF 5	Math, Engineering Science, Industrial Electronics
N5 Certificate	N/A	NQF 5	Electro-technics, Digital Electronics, Power Machines
N6 Certificate	N/A	NQF 5	Supervisory Management, Control Systems, Installation Rules

TRACEABILITY NOTE

Learner IDs 2004007064381 / 2100002023812 cross-referenced against National Learners' Records Database (NLRD).

NotebookLM


TECHNICAL SPECIFICATIONS: ELECTRICAL TRADE THEORY
STRESS PARAMETER ANALYSIS // MODULE WEIGHTING
OTHER: 20%
DC THEORY: 30% (PRIMARY LOAD)
RENEWABLE ENERGIES: 5%
MAGNETISM: 10%
SAFETY PRECAUTIONS: 10%
WIRING: 25% (DISTRIBUTION)
STRESS LEVEL
TECHNICAL DATA: DISTRIBUTION STATEMENT A
CALIBRATION STANDARDS
System calibrated to SANS 10142-1:2024 Edition 3.2 standards.
Calculations adhere to IEC and SI standard units.
100% Syllabus coverage verified.
MODULE WEIGHT VALUES EXTRACTED FROM CURRICULUM ASSESSMENT REPORT 191.
NotebookLM


ENVIRONMENTAL STRESS SCREENING: FIELD TEST REPORT
LOCATION: CITY POWER JOHANNESBURG // METHOD: MIL-STD-810 EQUIVALENT
TEST CONDITIONS
VARIABLE: LOAD SHEDDING / POWER INTERRUPTIONS
ENVIRONMENT: SUBSTATIONS, METERING POINTS
DURATION: FIELD VISIT CYCLE
PROCEDURE LOG
1 JOB SHADOWING: Observation of fault diagnosis and repair procedures in Test Branch.
2 SITE INSPECTION: Verification of infrastructure against SANS 10142.
3 CUSTOMER INTERFACE: Complaint resolution protocols.
RESULT: System demonstrated resilience despite operational disruptions (outages) and administrative bottlenecks.
NotebookLM

TEST RESULTS: OPERATIONAL COMPETENCY MATRIX

VERIFICATION METHOD: ON-SITE INSPECTION

ITEM	STATUS
METERING UNIT Installation, maintenance, and calibration of electricity meters (Smart Metering).	☑ [CHECKED]
FAULT DIAGNOSIS Identification of cable faults and network interruptions.	☑ [CHECKED]
SAFETY COMPLIANCE Adherence to OHSA (Occupational Health and Safety Act) protocols.	☑ [CHECKED]
EVIDENCE COLLECTION Submission of Logbooks and Supervisor Testimonials.	☑ [CHECKED]

"Aligning theoretical modules with operational realities to ensure job readiness."
— Source: Research Report on City Power Visit

DOCUMENT ID: OC-NTRX-003 // REV: 1.2 // DATE: 2024-10-27

NotebookLM

LIFE CYCLE MANAGEMENT: DIGITAL MODERNIZATION

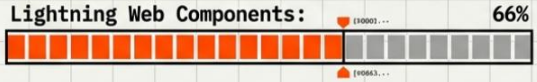
FIRMWARE UPGRADE: SALESFORCE / AI INTEGRATION

UPGRADE IN PROGRESS: AGENTFORCE AI

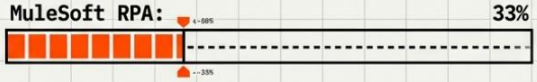
PERFORMANCE METRICS // TRAILHEAD DATA

CURRENT RANK: EXPEDITIONER
POINTS: 21,600
MOUNTAINEER PROGRESS: 5 OF 12

Lightning Web Components: 66%



MuleSoft RPA: 33%



Agentforce Quest: 86%

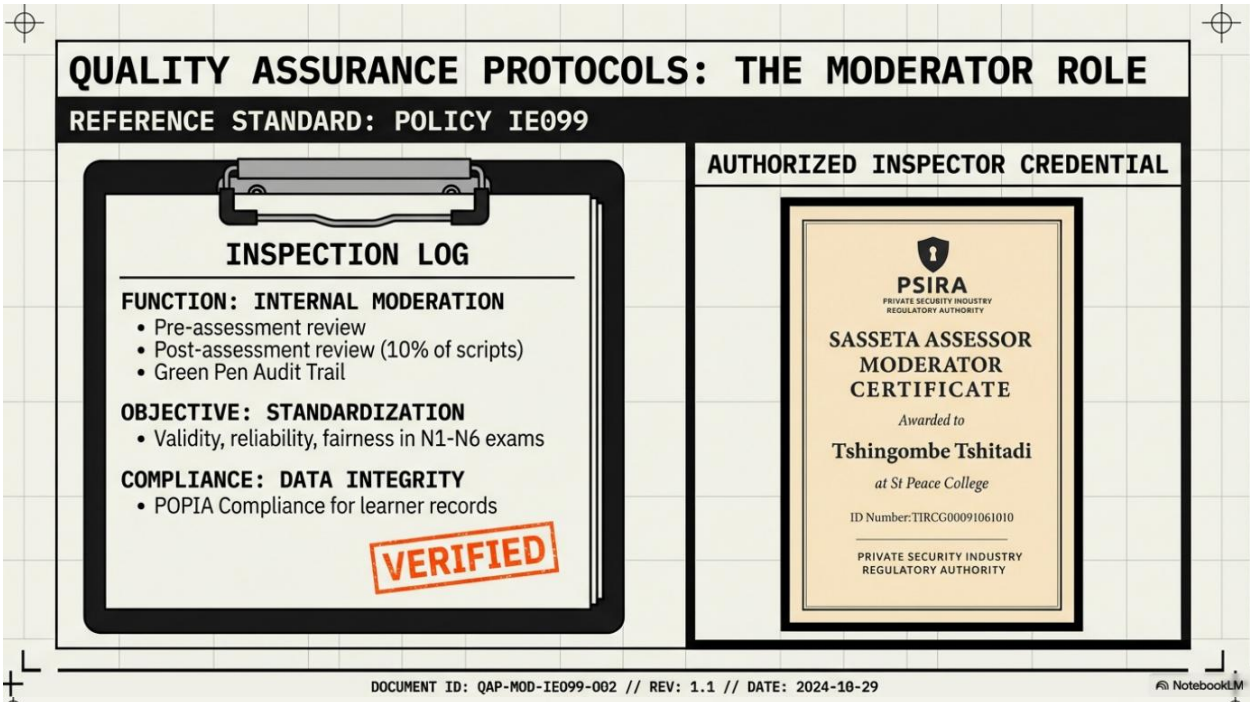
VERIFICATION ARTIFACTS // CROSS-CERTIFICATION

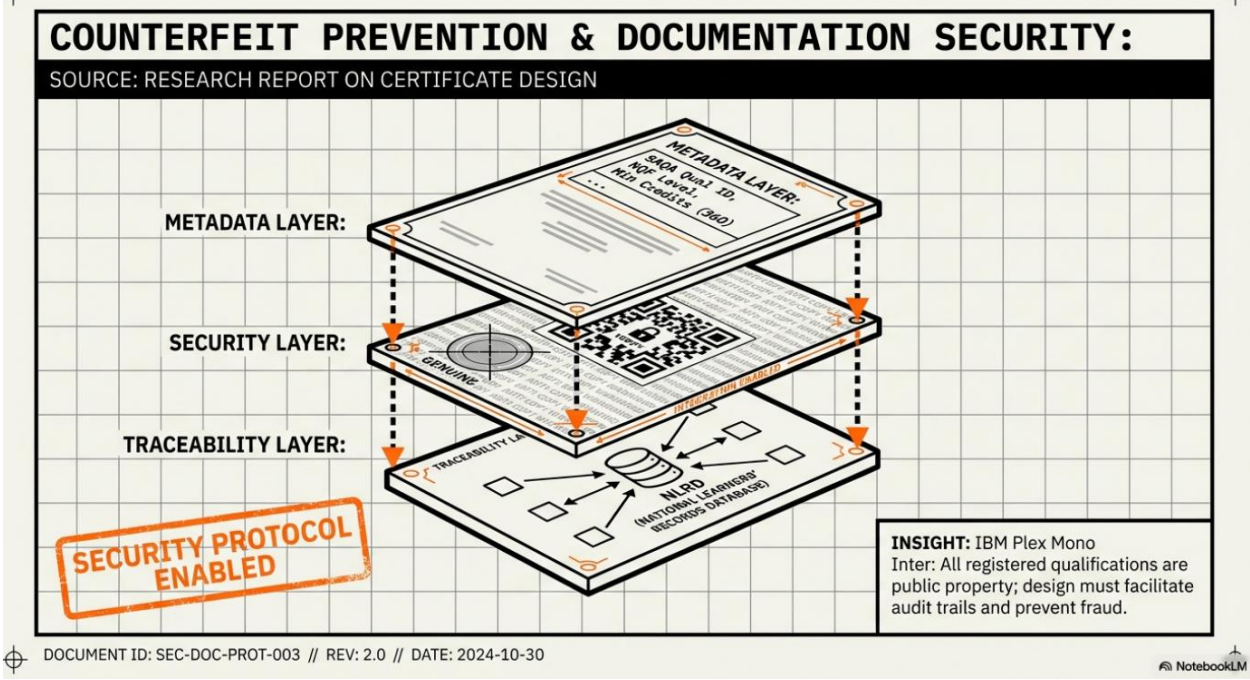
Schneider Electric South Africa
ECSA PORTAL CERTIFICATE
This is to certify that
Tshingombe Tshitadi
was registered in CPD at St Peace College
ID Number: TIRCG00091061010
SOUTH AFRICAN COUNCIL FOR EDUCATORS
CERTIFIED DOC

INDUSTRY CROSS-CERTIFICATION ARTIFACT

DOCUMENT ID: LCS-SFDC-AGNT-001 // REV: 1.0 // DATE: 2024-10-28

NotebookLM


QUALITY ASSURANCE PROTOCOLS: THE MODERATOR ROLE
REFERENCE STANDARD: POLICY IE099
INSPECTION LOG
FUNCTION: INTERNAL MODERATION
• Pre-assessment review
• Post-assessment review (10% of scripts)
• Green Pen Audit Trail
OBJECTIVE: STANDARDIZATION
• Validity, reliability, fairness in N1-N6 exams
COMPLIANCE: DATA INTEGRITY
• POPIA Compliance for learner records
VERIFIED
AUTHORIZED INSPECTOR CREDENTIAL
PSIRA
PRIVATE SECURITY INDUSTRY REGULATORY AUTHORITY
SASSETA ASSESSOR MODERATOR CERTIFICATE
Awarded to
Tshingombe Tshitadi
at St Peace College
ID Number:TIRCG00091061010
PRIVATE SECURITY INDUSTRY REGULATORY AUTHORITY
DOCUMENT ID: QAP-MOD-IE099-002 // REV: 1.1 // DATE: 2024-10-29
NotebookLM


COUNTERFEIT PREVENTION & DOCUMENTATION SECURITY:
SOURCE: RESEARCH REPORT ON CERTIFICATE DESIGN
METADATA LAYER:
SAQA Qual ID,
NQF Level,
Min Credits (360)
...
SECURITY LAYER:
GENUINE
TRACEABILITY LAYER:
NLRD
(NATIONAL LEARNERS' RECORDS DATABASE)
SECURITY PROTOCOL ENABLED
INSIGHT: IBM Plex Mono
Inter: All registered qualifications are public property; design must facilitate audit trails and prevent fraud.
DOCUMENT ID: SEC-DOC-PROT-003 // REV: 2.0 // DATE: 2024-10-30
NotebookLM

STANDARDS ALIGNMENT: MIL-STD-11991B CROSS-WALK

MIL-STD REQUIREMENT		TSHITADI APPLICATION
Incoming Inspection (Appx H)	→	Moderation of Student Portfolios (PoE)
Environmental Stress (Method 501)	→	City Power Field Operations / Load Shedding
Life Cycle Management (Sec 4.4)	→	Continuous Professional Development (Trailhead/CPD)
Configuration Management	→	Curriculum Engineering & Transcript Synthesis

DOCUMENT ID: STD-ALIGN-MIL-11991B-001 // REV: 1.0 // DATE: 2024-11-15

NotebookLM

OBSOLESCENCE MANAGEMENT & EXTENDED CAPABILITIES

SECONDARY SYSTEMS INVENTORY

ITEM 01: DIPLOMA - APPLIED PSYCHOLOGY

- **Spec**: Consumer Behavior (User-Centric Design).

ITEM 02: DIPLOMA - ACADEMIC QA

- **Spec**: Outcome-based Education.

ITEM 03: ADVANCED DIPLOMA

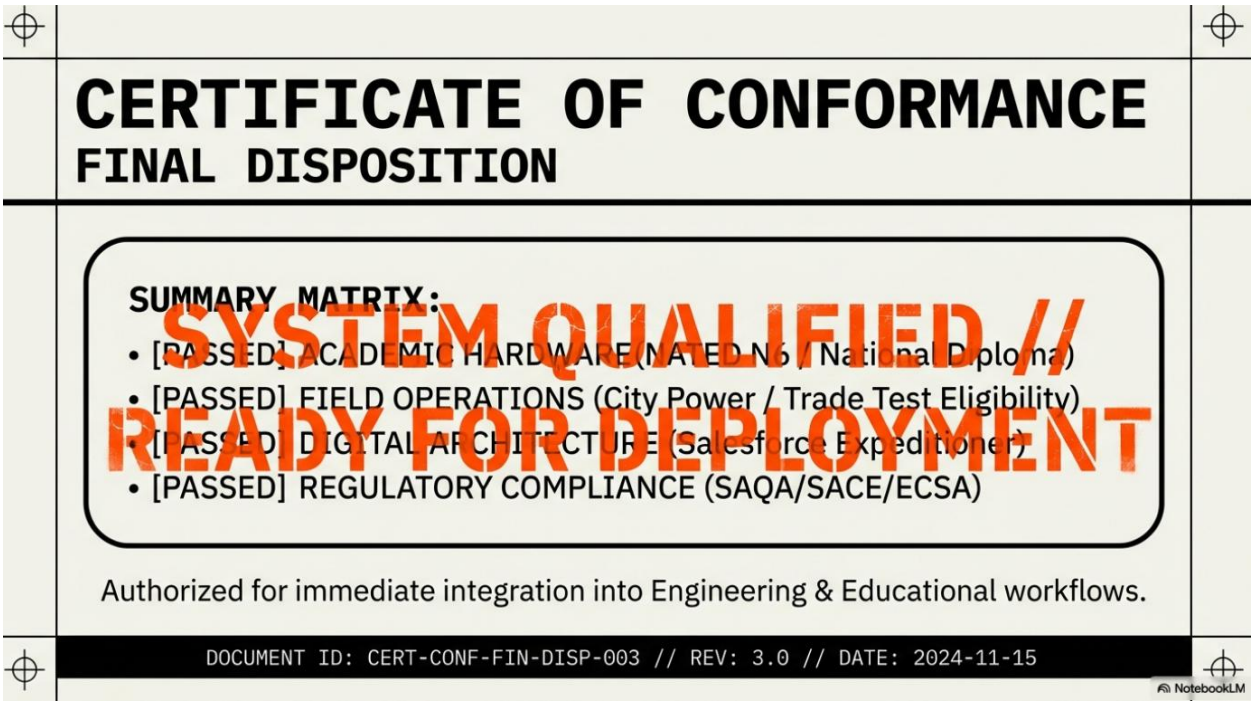
- **Spec**: High School Chemistry.

ITEM 04: COMMUNITY OUTPUT

- **Description**: Sci-Bono Jourter Expert Assessment Library.
- **Deliverables**: Digital CV writing resources, Technical documentation, Job preparation guides.

DOCUMENT ID: SEC-SYS-INV-002 // REV: 2.0 // DATE: 2024-10-30

NotebookLM


CERTIFICATE OF CONFORMANCE
FINAL DISPOSITION
SUMMARY MATRIX:
• [PASSED] ACADEMIC HARDWARE (NATED N6 / National Diploma)
• [PASSED] FIELD OPERATIONS (City Power / Trade Test Eligibility)
• [PASSED] DIGITAL ARCHITECTURE (Salesforce Expeditioner)
• [PASSED] REGULATORY COMPLIANCE (SAQA/SACE/ECSA)
SYSTEM QUALIFIED // READY FOR DEPLOYMENT
Authorized for immediate integration into Engineering & Educational workflows.
DOCUMENT ID: CERT-CONF-FIN-DISP-003 // REV: 3.0 // DATE: 2024-11-15
NotebookLM

The Engineering Excellence Blueprint: From Technical Standards to Professional Certification

PHASE 1: TECHNICAL RELIABILITY & COMPLIANCE (MIL-STD-11991B)

The Lifecycle Management Model

Track parts through four distinct phases to manage obsolescence.

Counterfeit Prevention Protocols

Mandate authenticity checks and 'Certificate of Conformance' documentation for all approved and authorized suppliers.

Reliability via Component Derating

Use digital microcircuits at only 90% of maximum supply voltage to ensure long-term stability.

PHASE 2: PROFESSIONAL PORTFOLIO & CREDENTIALING (NATED/SAQA)

Constructing the Portfolio of Evidence (PoE)

Include ICASS test scripts, ISAT practical tasks, and workpicce logbooks representing 2,670 hours of experience.

The NQF Level 6 National N Diploma

Requires successful completion of N4-N6 theoretical modules plus 18-24 months of verified workplace training.

Verification and Audit Readiness

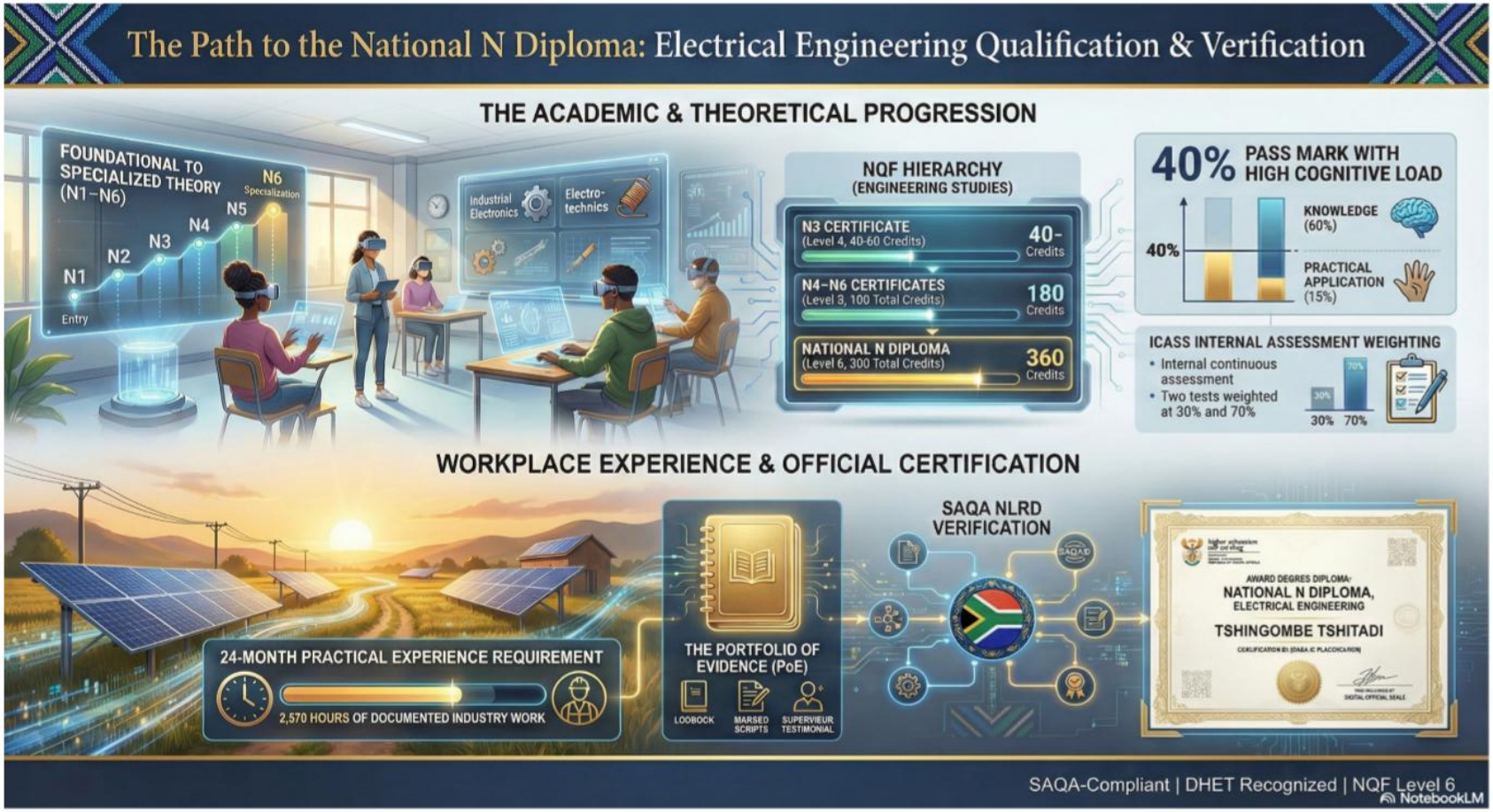
All qualifications must be validated against the SAQA National Learners' Records Database (NLRD) to prevent fraud.

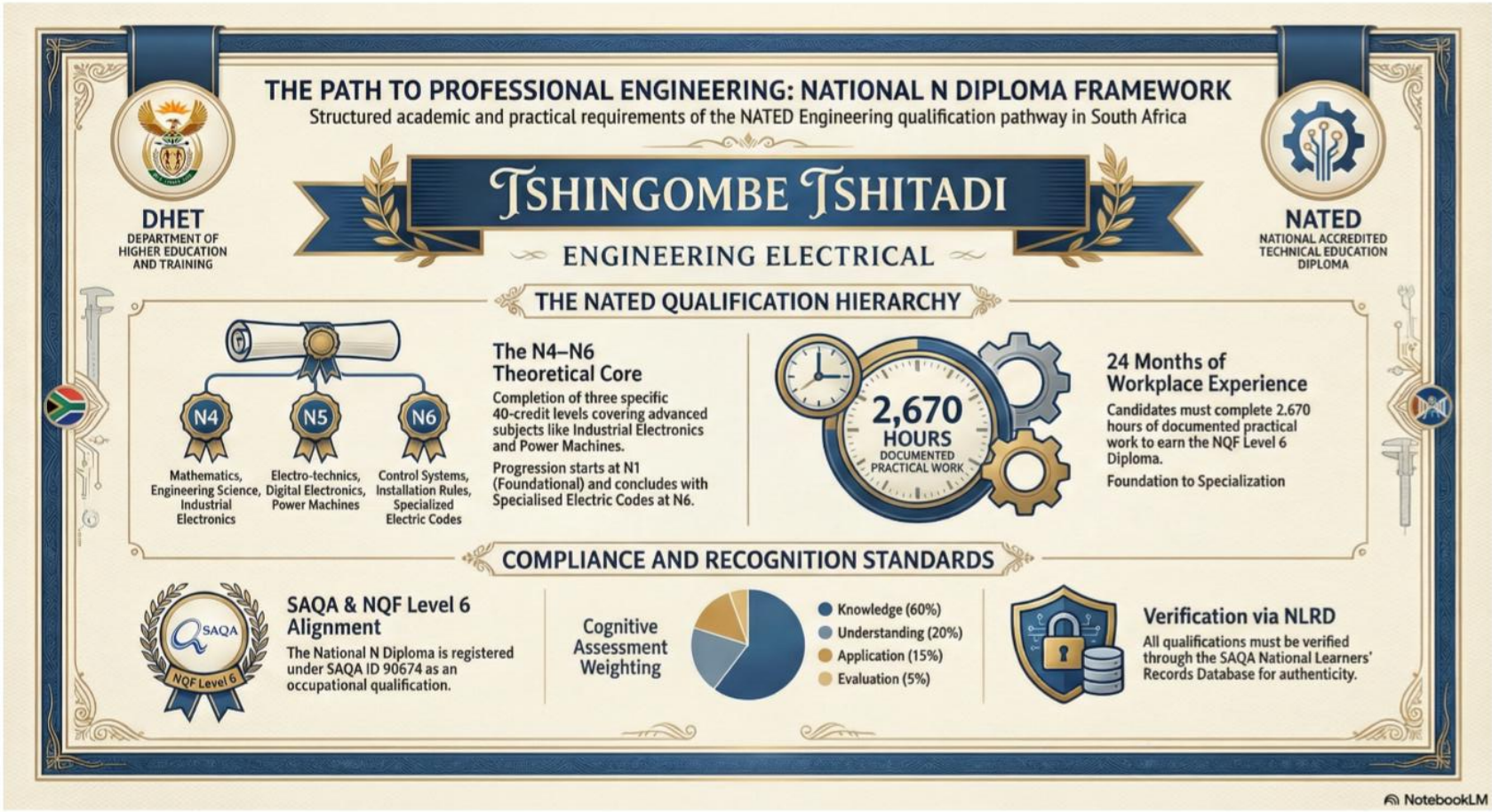
FRAMEWORK COMPARISON

OQSF (OCCUPATIONAL/VOCATIONAL)
Governing Body: QCTO
Primary Focus: Occupational/Vocational (National N Diploma)

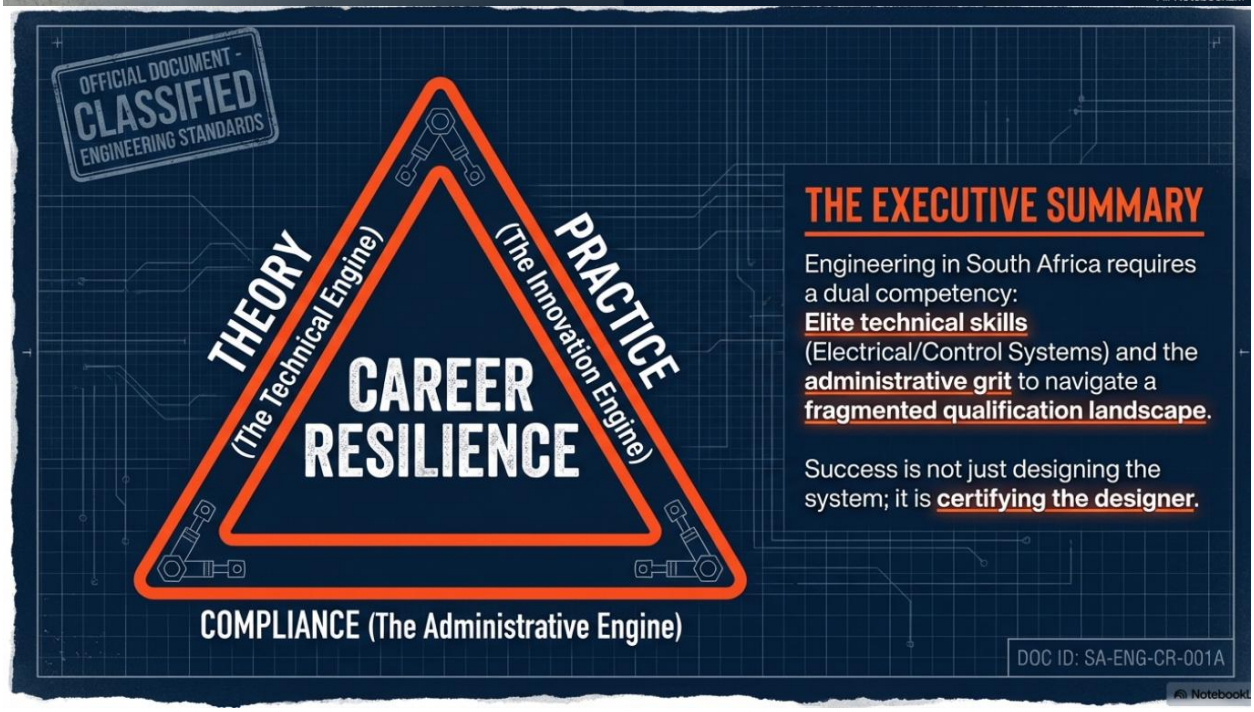
HEQSF (ACADEMIC/PROFESSIONAL)
Governing Body: CHE
Primary Focus: Academic/Professional (Bachelor's/Advanced Diploma)

NotebookLM


The Path to the National N Diploma: Electrical Engineering Qualification & Verification
THE ACADEMIC & THEORETICAL PROGRESSION
FOUNDATIONAL TO SPECIALIZED THEORY (N1–N6)
N1
Entry
N2
N3
N4
N5
N6
Specialization
Industrial Electronics
Electro-technics
NQF HIERARCHY (ENGINEERING STUDIES)
N3 CERTIFICATE
(Level 4, 40-60 Credits)
40-
Credits
N4–N6 CERTIFICATES
(Level 3, 100 Total Credits)
180
Credits
NATIONAL N DIPLOMA
(Level 6, 300 Total Credits)
360
Credits
40% PASS MARK WITH HIGH COGNITIVE LOAD
40%
KNOWLEDGE (60%)
PRACTICAL APPLICATION (15%)
ICASS INTERNAL ASSESSMENT WEIGHTING
• Internal continuous assessment
• Two tests weighted at 30% and 70%
30%
70%
WORKPLACE EXPERIENCE & OFFICIAL CERTIFICATION
24-MONTH PRACTICAL EXPERIENCE REQUIREMENT
2,570 HOURS OF DOCUMENTED INDUSTRY WORK
THE PORTFOLIO OF EVIDENCE (PoE)
LOGBOOK
MARKED SCRIPTS
SUPERVISEUR TESTIMONIAL
SAQA NLRD VERIFICATION
AWARD DEGREE DIPLOMA:
NATIONAL N DIPLOMA,
ELECTRICAL ENGINEERING
TSHINGOMBE TSHITADI
SAQA-Compliant | DHET Recognized | NQF Level 6
NotebookLM


THE PATH TO PROFESSIONAL ENGINEERING: NATIONAL N DIPLOMA FRAMEWORK
Structured academic and practical requirements of the NATED Engineering qualification pathway in South Africa
DHET
DEPARTMENT OF HIGHER EDUCATION AND TRAINING
TSHINGOMBE TSHITADI
ENGINEERING ELECTRICAL
NATED
NATIONAL ACCREDITED TECHNICAL EDUCATION DIPLOMA
THE NATED QUALIFICATION HIERARCHY
N4
N5
N6
Mathematics, Engineering Science, Industrial Electronics
Electro-technics, Digital Electronics, Power Machines
Control Systems, Installation Rules, Specialized Electric Codes
The N4–N6 Theoretical Core
Completion of three specific 40-credit levels covering advanced subjects like Industrial Electronics and Power Machines.
Progression starts at N1 (Foundational) and concludes with Specialised Electric Codes at N6.
2,670 HOURS
DOCUMENTED PRACTICAL WORK
24 Months of Workplace Experience
Candidates must complete 2.670 hours of documented practical work to earn the NQF Level 6 Diploma.
Foundation to Specialization
COMPLIANCE AND RECOGNITION STANDARDS
SAQA
NQF Level 6
SAQA & NQF Level 6 Alignment
The National N Diploma is registered under SAQA ID 90674 as an occupational qualification.
Cognitive Assessment Weighting
Knowledge (60%)
Understanding (20%)
Application (15%)
Evaluation (5%)
Verification via NLRD
All qualifications must be verified through the SAQA National Learners' Records Database for authenticity.
NotebookLM

THE RESILIENT ENGINER
A Framework for Assessment, Education, and
Trade in the South African Context.
Integrating Technical Mastery, Systemic Compliance, and Practical Innovation.
NotebookLM


OFFICIAL DOCUMENT -
CLASSIFIED
ENGINEERING STANDARDS
THEORY
(The Technical Engine)
PRACTICE
(The Innovation Engine)
CAREER
RESILIENCE
COMPLIANCE (The Administrative Engine)
THE EXECUTIVE SUMMARY
Engineering in South Africa requires a dual competency:
Elite technical skills
(Electrical/Control Systems) and the
administrative grit to navigate a
fragmented qualification landscape.
Success is not just designing the system; it is certifying the designer.
DOC ID: SA-ENG-CR-001A

THE LANDSCAPE & THE STRUGGLE.

THE FINAL BOSS: BUREAUCRACY.

Nov 2021 Exam Irregularities lead to invalidated results.

Certification backlogs at DHET/SITA create multi-year pauses in career progression.

SAQA
NATED
STATEMENT OF RESULTS
Irregularity Material Final
DIRECTOR: ASSESSMENT
N DIPLOMA
ELECTRICAL ENGINEERING
TSHINGOMBE TSHIFH

IRREGULARITY

Mathematics
Engineering Science
Engineering Drawing
Electrical Trade Theory
Industrial Electronics
Orientation Industrial
Plant Operationel
Electrotechnical
Electrotechnology

REVIEW NEEDED
DELAYED
ISSUING OF RESULT
ISSUING OFFICER

WEIGHTING OF COURSES IN CURRICULUM

Name of student

ENGINEERING STUDIES / N DIPLOMA ENGINEERING

Course in curriculum

INDUSTRIAL ELECTRONICS N1	
ENGINEERING DRAWING N1	- Indistriel electronicsN3
ELECTRICAL TRADE THEORY N1	- Electronical trade theory 33
MATHEMATICS N1	- Enginering science n3
N2 SCALING PLACEMENT	-Electro- technology n3
INDUSTRIAL ELECTRONICS N3	-iplant operation theory n3
ELECTRONICAL TRADE THEORY 3	-electro- technology n3
MATHEMATICS N3	-electrical electrochehnce
Inoustrial electronics N3	mathematic
Engineering science n4	electrotechnical
Industrial electronics N4	indiustrial electronic engineering science

Course	Census day enrotments	Credit value of lne course	FTE student Total
INDUSTRIAL ELECTRONICS N1	0.33	1	1
ENGINEERING DRAWING N1	0.33	1	1
ELECTRICAL TRADE THEORY N1	0.33	1	1
MATHEMATICS N1	0.33	1	1
N2 SCALING PLACEMENT	0.33	1	3

Recent applications

Submission No	Name	Date	Status	Electronic Certificate
2022070865055	Tshitadi Tshingombe	2024-02-12.11.36	Submitted	
202231165061	fiston tshingombe	2023-06-03.06.56	Pending Documen(s)	
202303115021	Tshradi Friaan Tshingo	2023-03-11 13.45	Pending Documen(s)	
202307125014	fshitadi tshingombe	2023-01-16 13.31	Pending, NCV and RAFED caurbcation / SI PEACE	

DOC ID: SA- NotebookLM

PILLAR 1: TECHNICAL IS THE NEW THEORETICAL.

Advanced Mathematics as the Foundation of System Safety.

INTEGRATION

$$E = \int P(t)\,dt$$

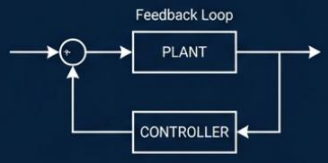
Calculating total energy consumption over time.

DIFFERENTIATION

$$V = L\frac{di}{dt}$$

Analyzing transient voltage spikes and inductive loads.

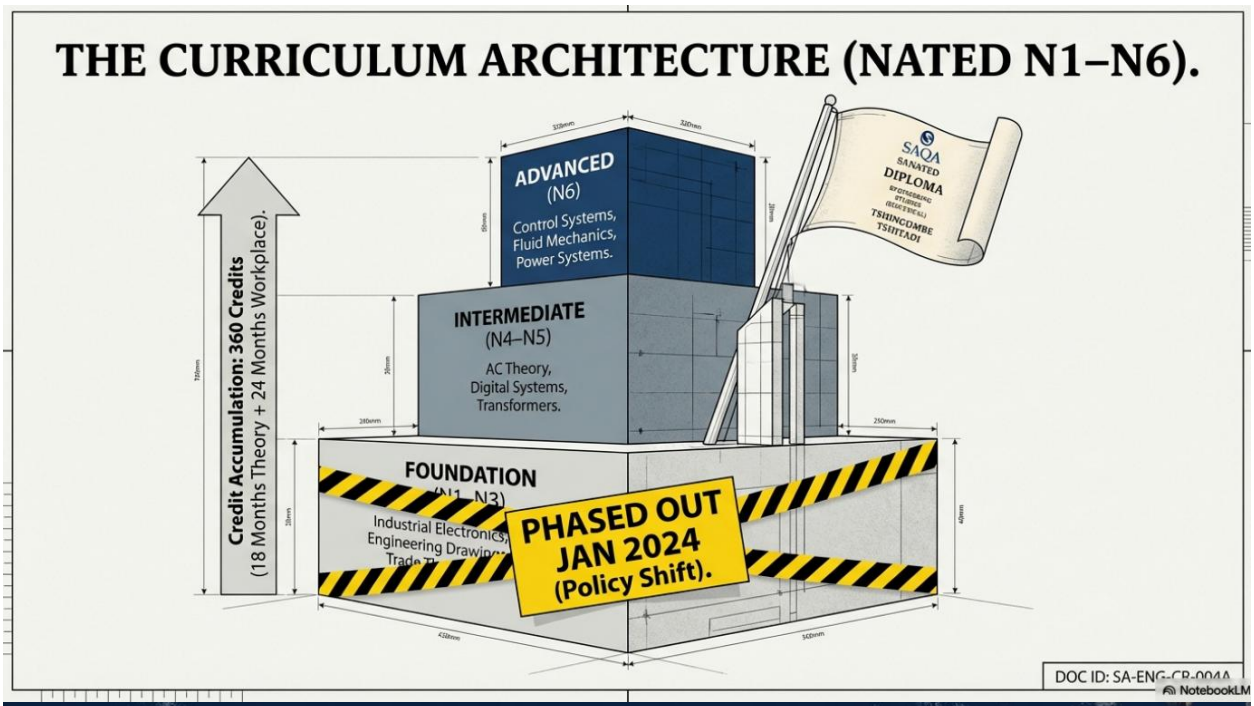
CONTROL THEORY

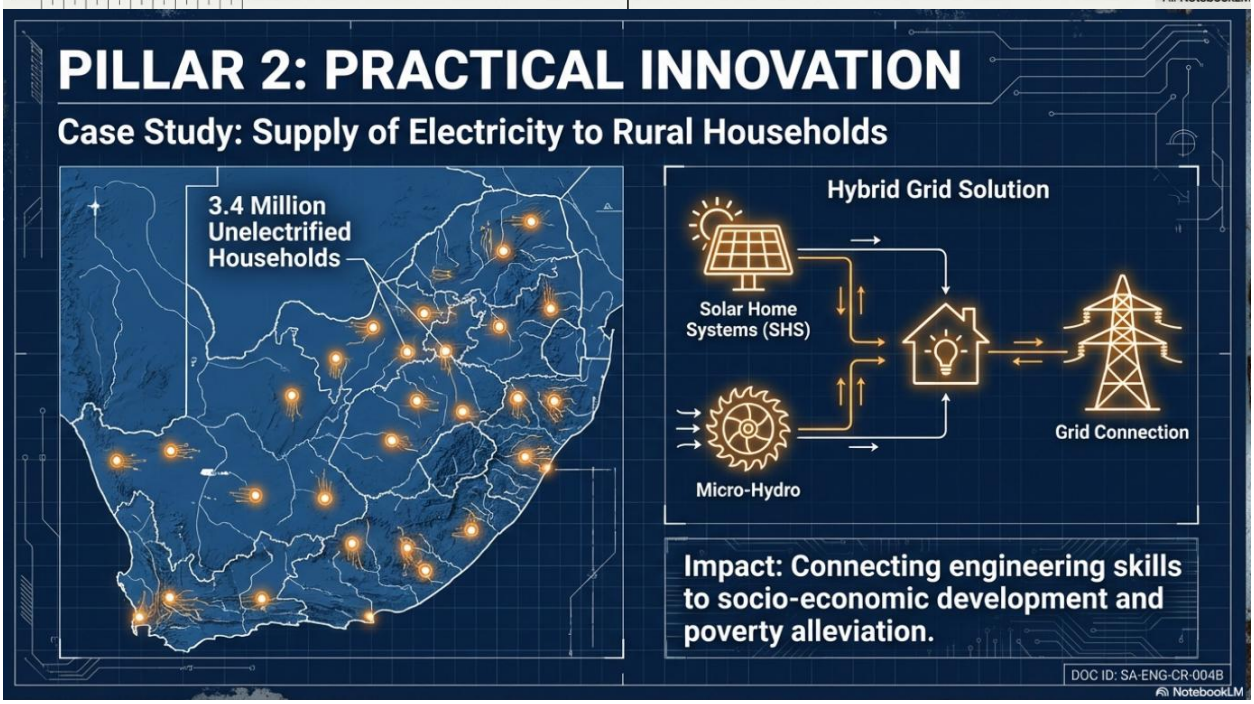


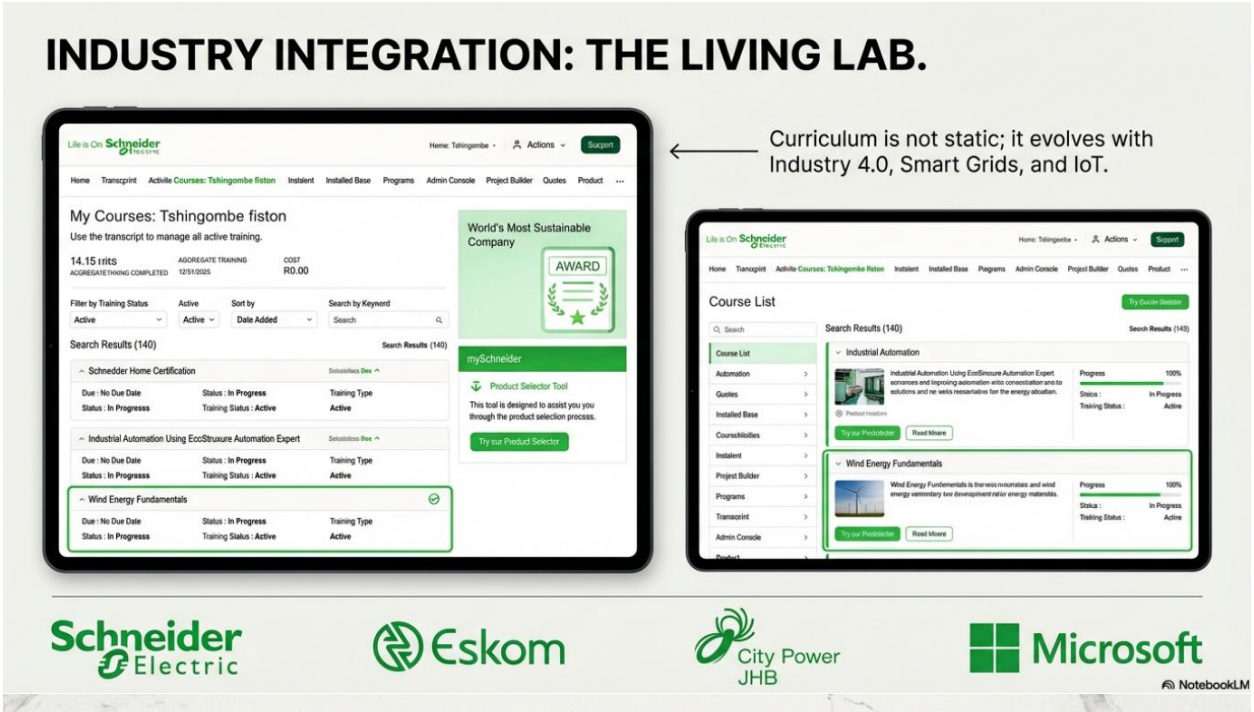
Modeling system stability using Differential Equations.

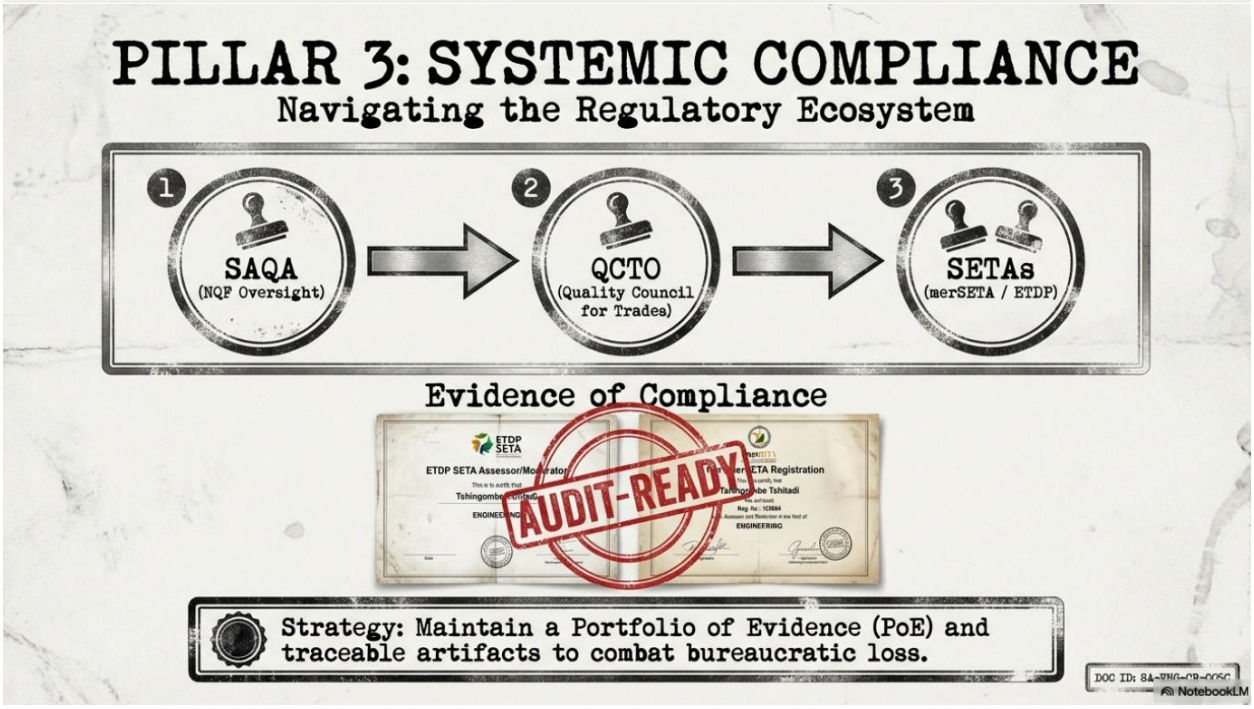
Math is not abstract. It is the language of grid optimization.

DOC ID: SA-ENG-CR-003A
NotebookLM

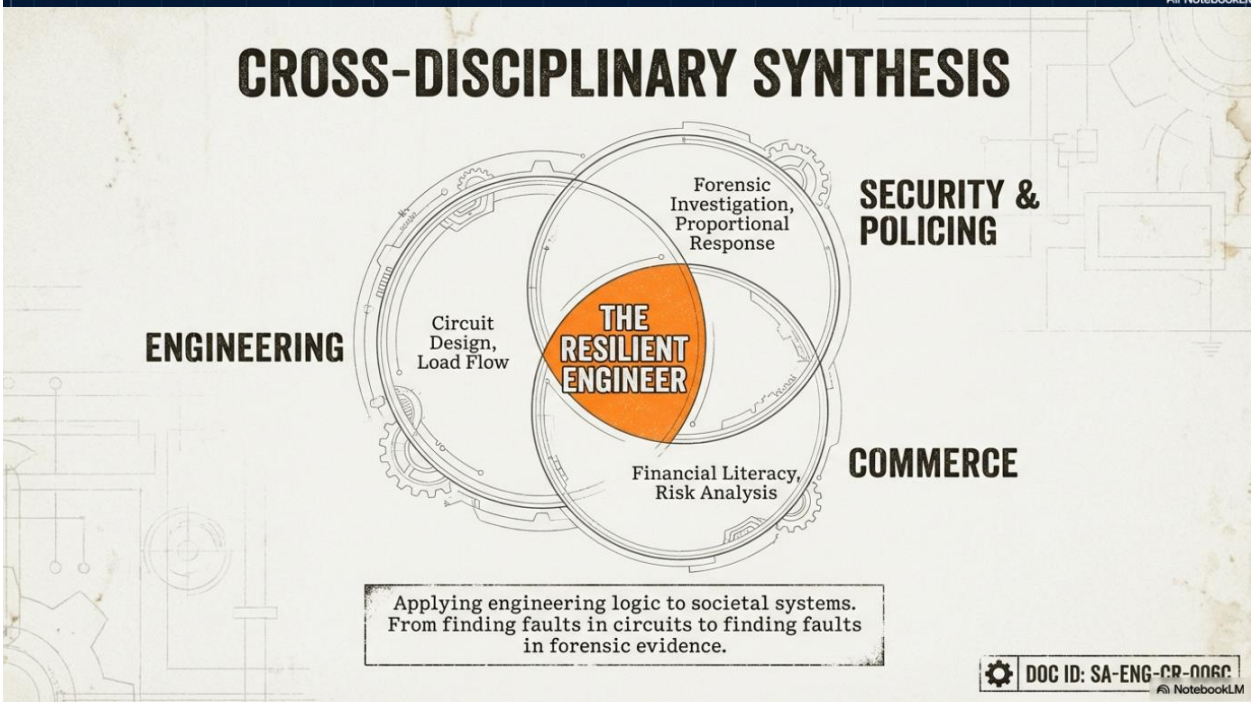

THE CURRICULUM ARCHITECTURE (NATED N1–N6).
ADVANCED
(N6)
Control Systems,
Fluid Mechanics,
Power Systems.
INTERMEDIATE
(N4–N5)
AC Theory,
Digital Systems,
Transformers.
FOUNDATION
Industrial Electronics,
PHASED OUT
JAN 2024
(Policy Shift).
Credit Accumulation: 360 Credits
(18 Months Theory + 24 Months Workplace).
SAQA
SANATED
DIPLOMA
TSHUNGUMBE
TSHITAXDI
DOC ID: SA-ENG-CR-004A
NotebookLM

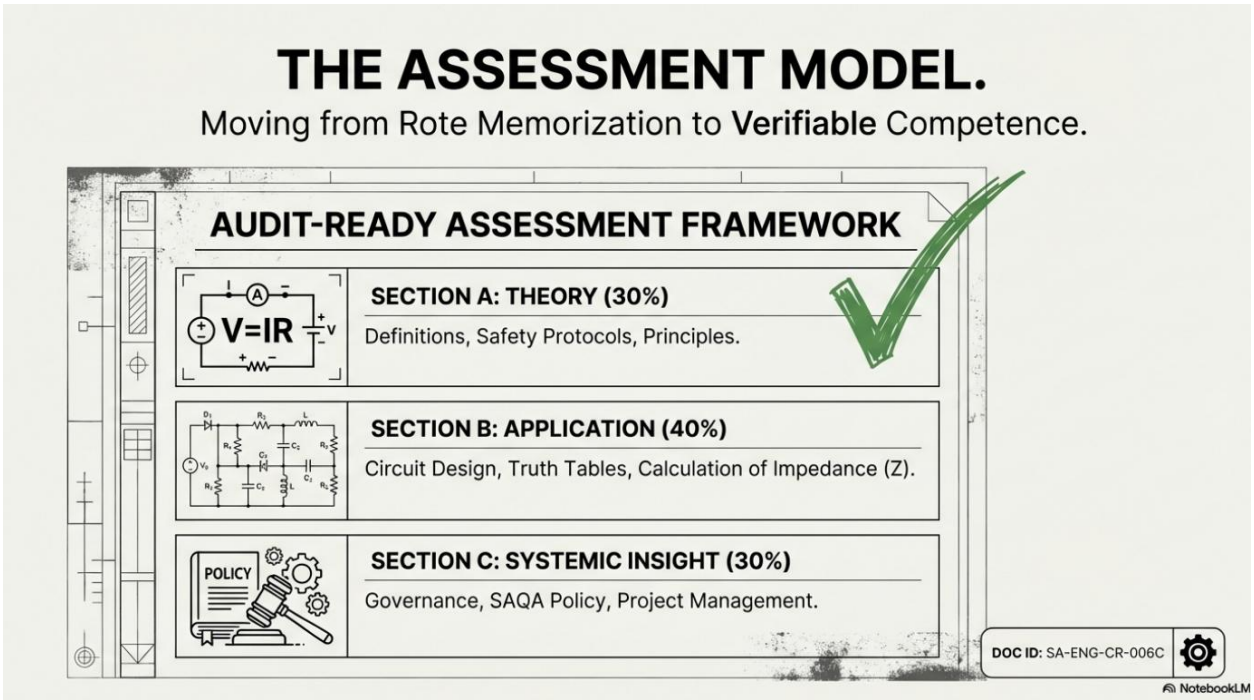

PILLAR 2: PRACTICAL INNOVATION
Case Study: Supply of Electricity to Rural Households
3.4 Million
Unelectrified
Households
Hybrid Grid Solution
Solar Home
Systems (SHS)
Micro-Hydro
Grid Connection
Impact: Connecting engineering skills
to socio-economic development and
poverty alleviation.
DOC ID: SA-ENG-CR-004B
NotebookLM


INDUSTRY INTEGRATION: THE LIVING LAB.
Curriculum is not static; it evolves with Industry 4.0, Smart Grids, and IoT.
My Courses: Tshingombe fiston
Use the transcript to manage all active training.
World's Most Sustainable Company
AWARD
mySchneider
Product Selector Tool
Course List
Industrial Automation
Wind Energy Fundamentals
Schneider Electric
Eskom
City Power JHB
Microsoft
NotebookLM

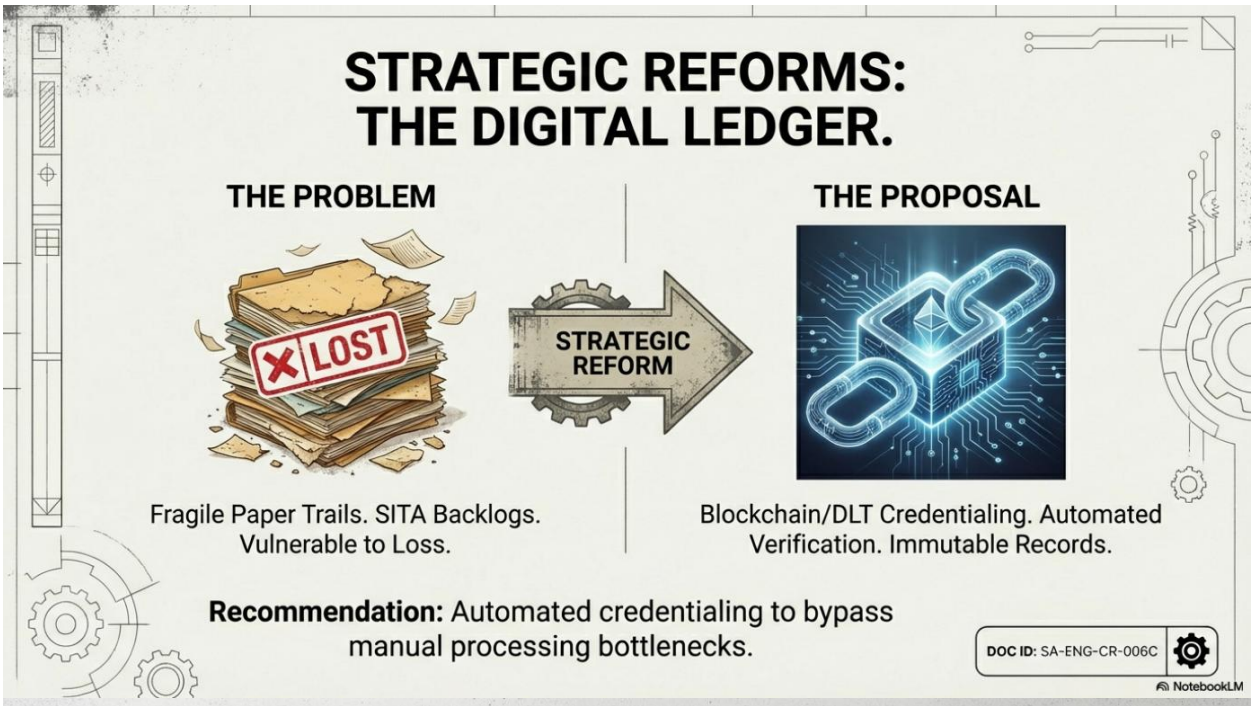

PILLAR 3: SYSTEMIC COMPLIANCE
Navigating the Regulatory Ecosystem
1
SAQA
(NQF Oversight)
2
QCTO
(Quality Council for Trades)
3
SETAs
(merSETA / ETDP)
Evidence of Compliance
ETDP SETA
ETDP SETA Assessor/Moderator
AUDIT-READY
Strategy: Maintain a Portfolio of Evidence (PoE) and traceable artifacts to combat bureaucratic loss.
NotebookLM

MODERNIZING THE TRADE: 4IR & DIGITAL TWINS
Function OptimizeGrid()
Return Efficiency
End Function
• Digital Tools: Visual Basic, GitHub, Azure.
• Automation: PLCs, Robotics, SCADA.
• Security: Blockchain for immutable academic records.
Microsoft
CERTIFICATE OF COMPLETION
This is to certify that
TSHINGOMBE TSHITADI
has successfully passed the assessment of
Engineering, Azure, GitHub
has successfully assessed as
Engineering, Azure, GitHub
with Honours
Ryan Morris
Microsoft Representative
01.12.2022
NotebookLM

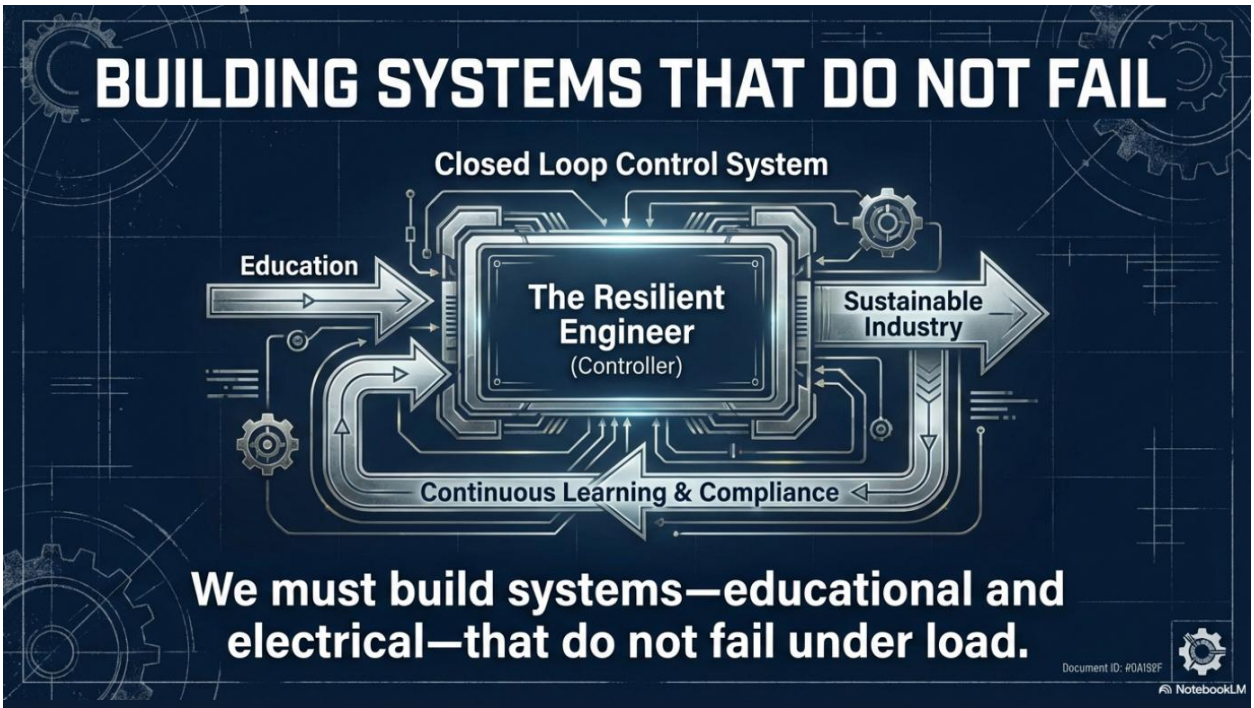

CROSS-DISCIPLINARY SYNTHESIS
ENGINEERING
Circuit Design, Load Flow
SECURITY & POLICING
Forensic Investigation, Proportional Response
COMMERCE
Financial Literacy, Risk Analysis
THE RESILIENT ENGINEER
Applying engineering logic to societal systems. From finding faults in circuits to finding faults in forensic evidence.
DOC ID: SA-ENG-CR-006C
NotebookLM

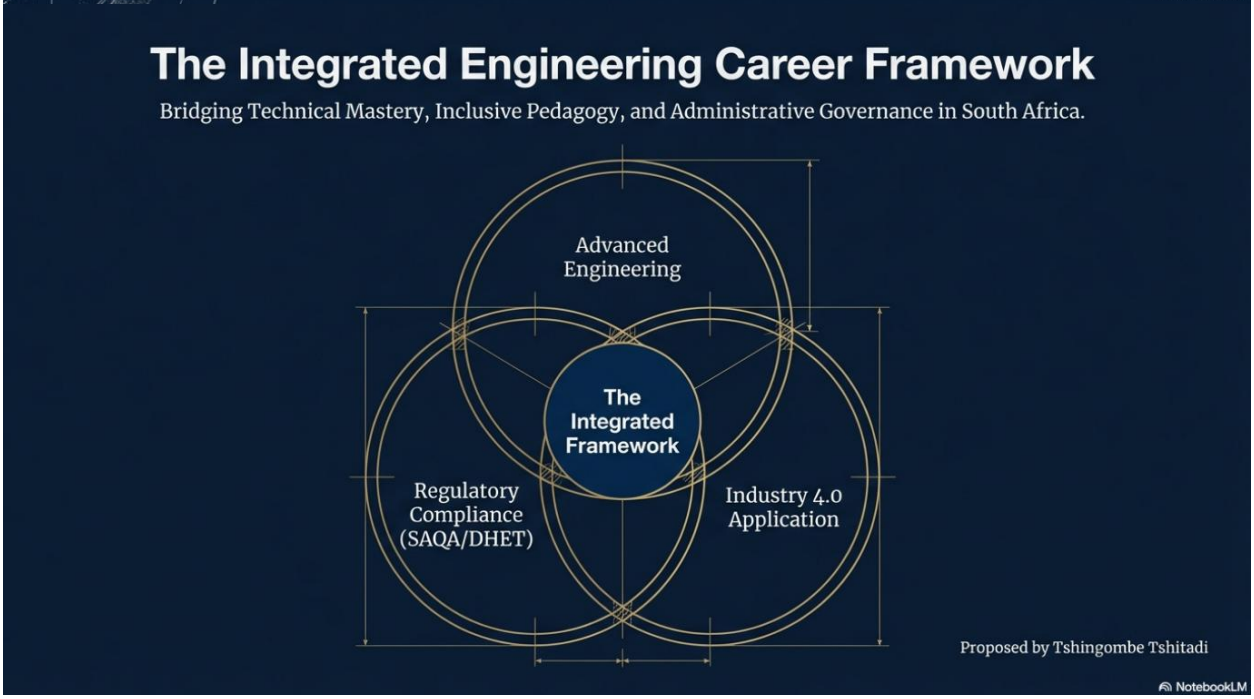

THE ASSESSMENT MODEL.
Moving from Rote Memorization to Verifiable Competence.
AUDIT-READY ASSESSMENT FRAMEWORK
V=IR
SECTION A: THEORY (30%)
Definitions, Safety Protocols, Principles.
SECTION B: APPLICATION (40%)
Circuit Design, Truth Tables, Calculation of Impedance (Z).
POLICY
SECTION C: SYSTEMIC INSIGHT (30%)
Governance, SAQA Policy, Project Management.
DOC ID: SA-ENG-CR-006C
NotebookLM

CONTINUOUS PROFESSIONAL DEVELOPMENT (CPD).
The Diploma is just the Tutorial Level.
Micro-Credentials.
Microsoft Azure
AIU
Alison
International Benchmarking.
National Diploma (Foundation).
Professional Registration (ECSA).
COURSEWORK TRANSCRIPT
DOC ID: SA-ENG-CR-006C
NotebookLM


STRATEGIC REFORMS:
THE DIGITAL LEDGER.
THE PROBLEM
LOST
STRATEGIC REFORM
THE PROPOSAL
Fragile Paper Trails. SITA Backlogs. Vulnerable to Loss.
Blockchain/DLT Credentialing. Automated Verification. Immutable Records.
Recommendation: Automated credentialing to bypass manual processing bottlenecks.
DOC ID: SA-ENG-CR-006C
NotebookLM

EVIDENCE OF COMPETENCE: AN AUDIT-READY PORTFOLIO.
IJETR
International Journal of Engineering & Technical Research
CERTIFICATE
This is to certify that
TSHINGOMBE TSHITADI
has participated in the research published by this diploma repositte
TSHINGOMBE TSHITADI
IJETR3183
QCTO
SEIFSA
TRAINING CENTRE
QUOR RECTIFICATE TESTE GRADE
ENGINEERING TRADES MAN CERTIFICATE
This is to certify that
Tshingombe Tshitad
Occupation
Engineering Fabrication
Registrar
NRF
TRANSCRIPT
This certifies that
TSHINGOMBE TSHITADI
has been granted a diploma in
SARAO ENGINEERING
Awarded: 21-07-2025
Ryan Morris
TRANSCRIPT 01.12.2025
A career is not a resume. It is a verified Portfolio of Evidence.
NotebookLM


BUILDING SYSTEMS THAT DO NOT FAIL
Closed Loop Control System
Education
The Resilient Engineer
(Controller)
Sustainable Industry
Continuous Learning & Compliance
We must build systems—educational and electrical—that do not fail under load.
Document ID: #0A1S2F
NotebookLM


The Integrated Engineering Career Framework
Bridging Technical Mastery, Inclusive Pedagogy, and Administrative Governance in South Africa.
Advanced Engineering
The Integrated Framework
Regulatory Compliance (SAQA/DHET)
Industry 4.0 Application
Proposed by Tshingombe Tshitadi
NotebookLM

The Dual Competency Model

Engineering Meets Administration

1. Technical Mastery

Advanced Electrical & Mechanical Engineering combined with Applied Mathematics. Moving beyond theory to system optimization.

2. Administrative Resilience

Navigating SAQA, DHET, and QCTO landscapes. The ability to maintain an 'Audit-Ready" status despite systemic friction.

3. Industry Integration

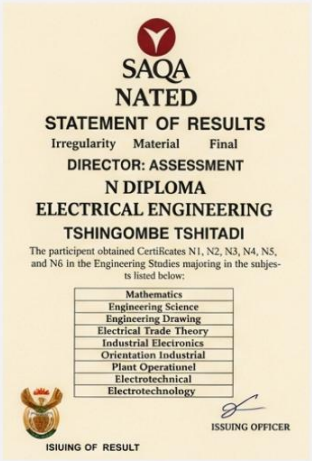
Direct links to industry giants like Eskom, City Power, and Schneider Electric. Bridging the gap between the classroom and the grid.

Strategic Goal: Creating resilient professionals who are technically elite and bureaucratically compliant.

NotebookLM

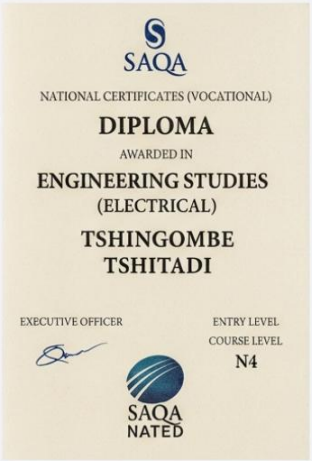
The Core Conflict: The Real Final Boss is Bureaucracy

Engineering Meets Administration

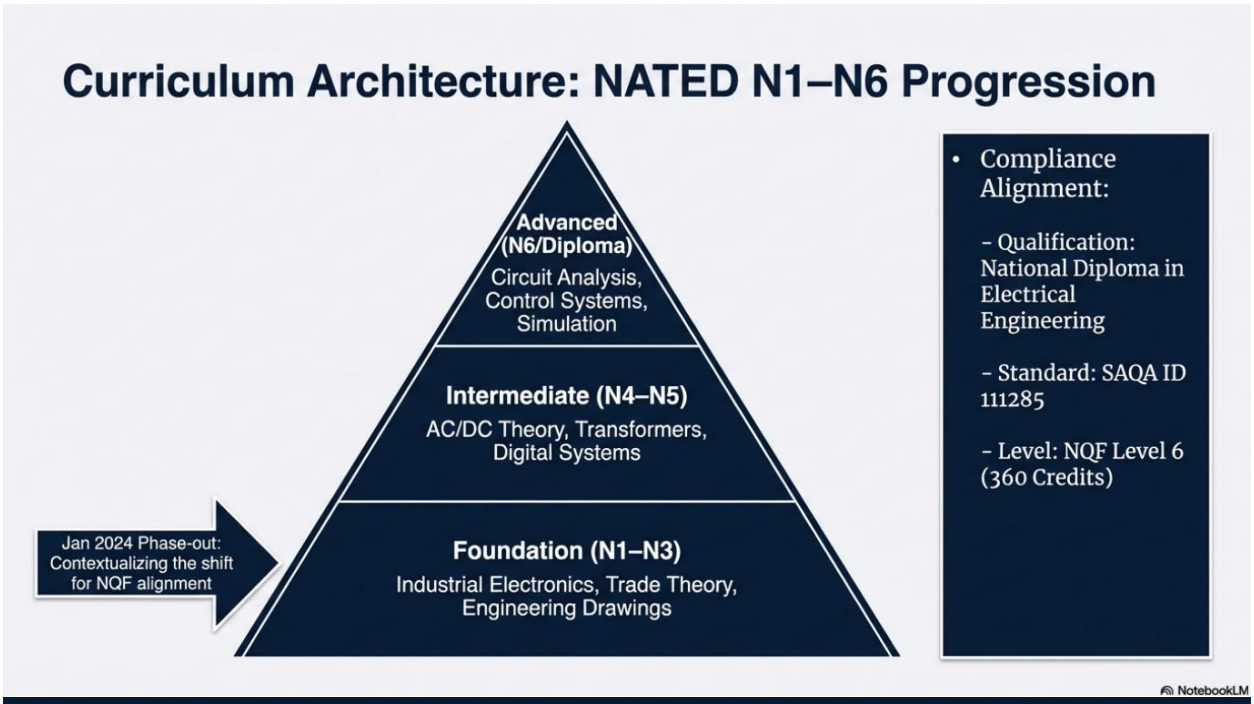

SAQA
NATED
STATEMENT OF RESULTS
Irregularity Material Final
DIRECTOR: ASSESSMENT
N DIPLOMA
ELECTRICAL ENGINEERING
TSHINGOMBE TSHITADI
The participent obtained Certificates N1, N2, N3, N4, N5, and N6 in the Engineering Studies majoring in the subjects listed below:
Mathematics
Engineering Science
Engineering Drawing
Electrical Trade Theory
Industrial Electronics
Orientation Industrial
Plant Operatiunel
Electrotechnical
Electrotechnology
ISSUING OFFICER
ISIUING OF RESULT

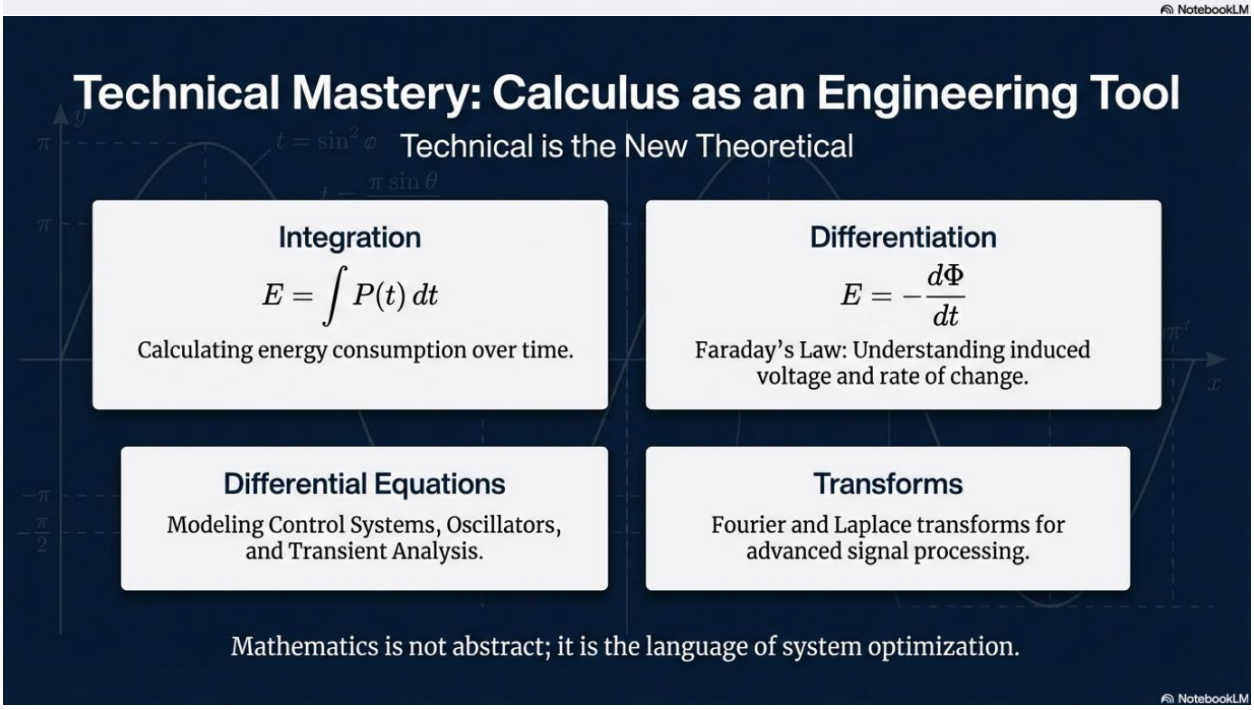
Systemic Friction

Counter-Intuitive Lesson #3:
"The Real Final Boss is Bureaucracy." Success requires navigating exam irregularities, backlogs, and foreign qualification assessments.


SAQA
NATIONAL CERTIFICATES (VOCATIONAL)
DIPLOMA
AWARDED IN
ENGINEERING STUDIES
(ELECTRICAL)
TSHINGOMBE
TSHITADI
EXECUTIVE OFFICER
ENTRY LEVEL
COURSE LEVEL
N4
SAQA
NATED

NotebookLM


Curriculum Architecture: NATED N1–N6 Progression
Advanced (N6/Diploma)
Circuit Analysis, Control Systems, Simulation
Intermediate (N4–N5)
AC/DC Theory, Transformers, Digital Systems
Foundation (N1–N3)
Industrial Electronics, Trade Theory, Engineering Drawings
Jan 2024 Phase-out: Contextualizing the shift for NQF alignment
• Compliance Alignment:
- Qualification: National Diploma in Electrical Engineering
- Standard: SAQA ID 111285
- Level: NQF Level 6 (360 Credits)
NotebookLM


Technical Mastery: Calculus as an Engineering Tool
Technical is the New Theoretical
Integration
$E = \int P(t)\,dt$
Calculating energy consumption over time.
Differentiation
$E = -\frac{d\Phi}{dt}$
Faraday's Law: Understanding induced voltage and rate of change.
Differential Equations
Modeling Control Systems, Oscillators, and Transient Analysis.
Transforms
Fourier and Laplace transforms for advanced signal processing.
Mathematics is not abstract; it is the language of system optimization.
NotebookLM

Industry Integration: The 'True Curriculum'

My Courses: Tshingombe fiston
Use the transcript to manage all active training.
14.15 HRS
AGGREGATE TRAINING COMPLETED 14.15/.0
FISCAL YEAR ENDING 12/31/2025
COST R0.00
Filter by Training Status: Active
Sort by Date Added
Filter by Training Type: All Types
Search
Search Results (140)
Schnidder Home Certification
Industrial Automation Using EcoStruxure Automaion Expert
Wind Energy Fundamentals
EBO 2024: Advanced Engineering
Professional Energy Manager Esain LearningPath
EBO 2023: Engineering EBO
EBO 2023: Engineering Upgrade
Sustainability to Modicon Switches
Advanced Electrical Safety (Multiningal)
How to Perform's Security Code Review
FcoStrusure Building: Prescription. Mechatcal & Control - Part 1
MotionSizer for PacDrive 3 (VILT)
EcoStrusure Building: Prescription ad/Fond Geographic Inform.
MotionSizer for PacDrive 3 [Test]
Due : No Due Date
Training Type:
Curriculum
Online Class
Test
In Progress
Failed
Active
"Counter-Intuitive Lesson #5: Industry Integration is the True Curriculum."
World's Most Sustainable Company
AWARD
mySchneider
Product Selector Tool
This tool is designed to assist you you through the product selection process.
Try our Product Selector
©2025. Schnéder Terms of Use Privacy Policy Cooke Notice

- **Schneider EcoStruxure:** Power management & automation.
- **Control Systems:** PID Controllers, SCADA, PLCs.
- **Partnerships:** Eskom, City Power, Schneider Electric.

NotebookLM

4IR Readiness: Digital Systems & Automation

Cloud & AI

Microsoft Azure AI & Machine Learning.

Data Engineering.

Programming

Visual Basic (VBA) for logic gates.

GitHub for version control.

Digital Logic

Boolean Algebra.

NAND/NOR Gate Analysis.

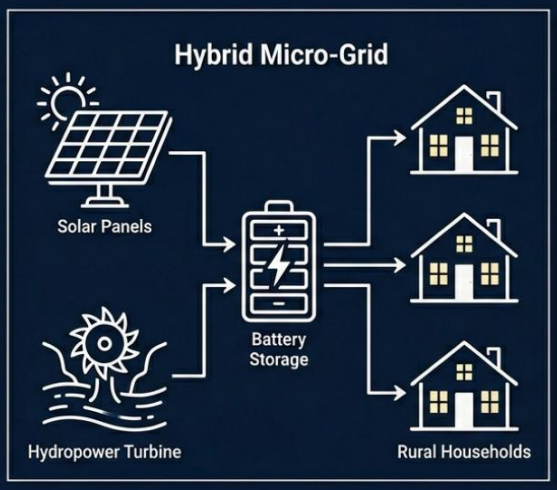
Philosophy: 'Specialization is for Insects' — The modern technician is a polymath.

NotebookLM

Case Study: Sustainable Rural Electrification

The Challenge:

- 3.4 Million Household Backlog
- Grid Instability



The Solution:

- Solar Home Systems (SHS)
- Hydropower Integration
- Local Job Creation

Applying Kirchhoff's Laws and impedance analysis to

Governance: The 'Audit-Ready' Professional

The Audit Trail Methodology

Portfolio of Evidence (PoE) & Trade Logs → Digital Traceability (Blockchain/GitHub) → Verified Role Certification (Assessor/Moderator)

NotebookLM

Trade Qualification & Quality Assurance

Regulatory Compliance:

- Body: Quality Council for Trades and Occupations (QCTO)
- Mandate: NQF Act 67 of 2008

Occupational Competence:

- Requirement: 18-24 Months Workplace Experience
- Standard: Red Seal/Artisan Status

NotebookLM

Cross-Disciplinary Synthesis: Engineering & Law

Labor Law

- CCMA Disputes
- Workplace Regulations

Policing & Security

- Proportional Response Protocols
- Forensic Investigation
- Public Safety in Infrastructure

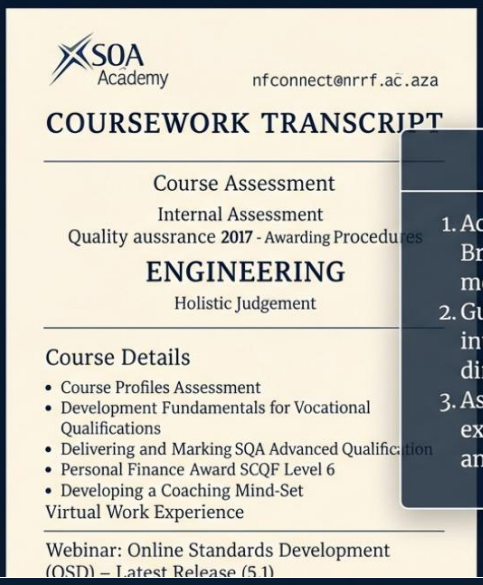
Information Security

- The 5 Pillars:
- Confidentiality, Integrity, Availability
- Authentication, Non-repudiation

A technician must understand the legal liabilities of infrastructure and the security of digital control systems.

NotebookLM

Inclusive Pedagogy & Assessment



SOA Academy nfconnect@nrrf.ac.aza

COURSEWORK TRANSCRIPT

Course Assessment

Internal Assessment

Quality aussrance 2017 - Awarding Procedures

ENGINEERING

Holistic Judgement

Course Details

- Course Profiles Assessment
- Development Fundamentals for Vocational Qualifications
- Delivering and Marking SQA Advanced Qualification
- Personal Finance Award SCQF Level 6
- Developing a Coaching Mind-Set

Virtual Work Experience

Webinar: Online Standards Development (OSD) – Latest Release (5.1)

Core Values

1. Accessibility: Integration of Braille awards and Montessori methods.
2. Guidance: Reformed client intake forms for better career direction.
3. Assessment: Moving beyond exams to "Course Profiles" and portfolios.

NotebookLM

Systemic Challenges & Strategic Reforms

The Systemic Obstacles

- Certification Backlogs & Irregular Results
- Delayed Foreign Qualification Recognition
- Curriculum Disconnect (Theory vs. Practice)

The Strategic Reforms

1. **Curriculum Reform:** Full alignment of NATED with NQF & Modern Tech.
2. **Digital Transformation:** Blockchain credentialing to eliminate backlogs.
3. **Formal Partnerships:** Work-Integrated Learning (WIL) with municipal entities.

NotebookLM

Conclusion: The Career as a Living Document

Resilience. Adaptability. Verification. Your Diploma is Just the Tutorial Level. The real proof is in the Portfolio.

NotebookLM

A Validated Framework for Future Engineers

'The attention to small details... reliability from minor parts... hidden consequences matter.' — Lessons Beyond Engineering

Framework Proposal by Tshingombe Tshitadi

NotebookLM

The Resilient Engineering Framework:
Bridging Technical Mastery and Systemic Governance

TECHNICAL & INCLUSIVE MASTERY

Multidisciplinary Engineering Core

Integration of heavy current systems, control theory, and robotics with advanced calculus foundations.

Inclusive Pedagogy Integration

Incorporating Montessori methods and Braille certification to broaden accessibility in technical education.

Industry-Aligned Curriculum

Direct alignment with NQF Level 6 standards and industry leaders like Schneider Electric and Eskom.

Schneider Electric + Eskom — NQF Level 6

CONTEXT: This framework explores the intersection of high-level electrical engineering, vocational education (NATED/NQF), and wholesaler trade. It presents a "dual-mastery" approach where technical proficiency is combined with bureaucratic resilience to navigate South Africa's certification backlogs and regulatory complexities.

STANDARD QUALIFICATION PARAMETERS	
SAQA Qualification ID	111285
NQF Level	Level 6
Total Credits	360 Credits

NAVIGATING SYSTEMIC GOVERNANCE

Bureaucratic Resilience

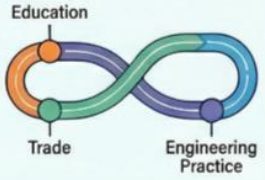
Strategies to manage certification backlogs and examination irregularities through robust record-keeping.

Audit-Ready Documentation

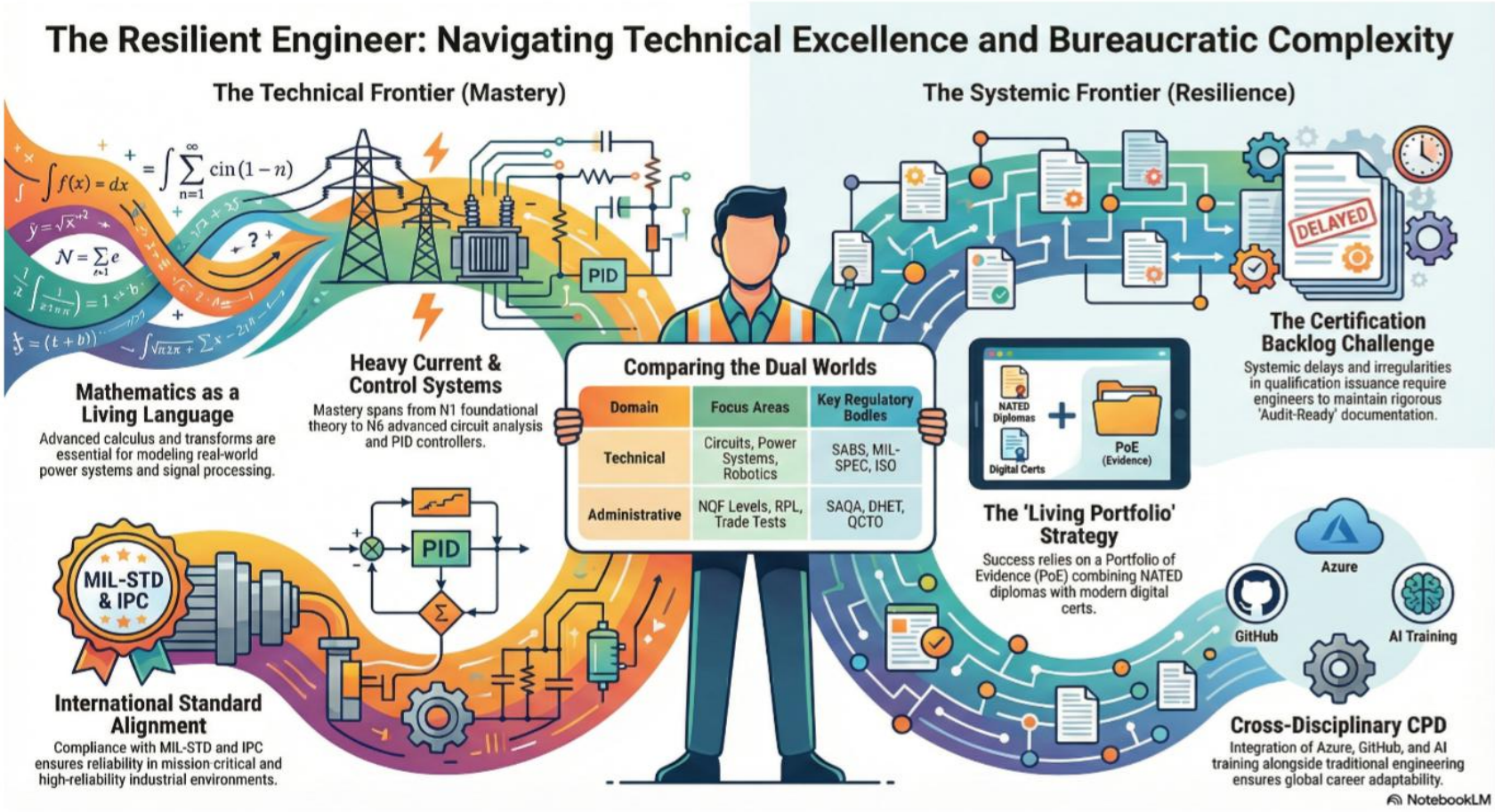
Utilizing VBA dashboards, portfolios of evidence, and blockchain for secure, transparent credentialing.

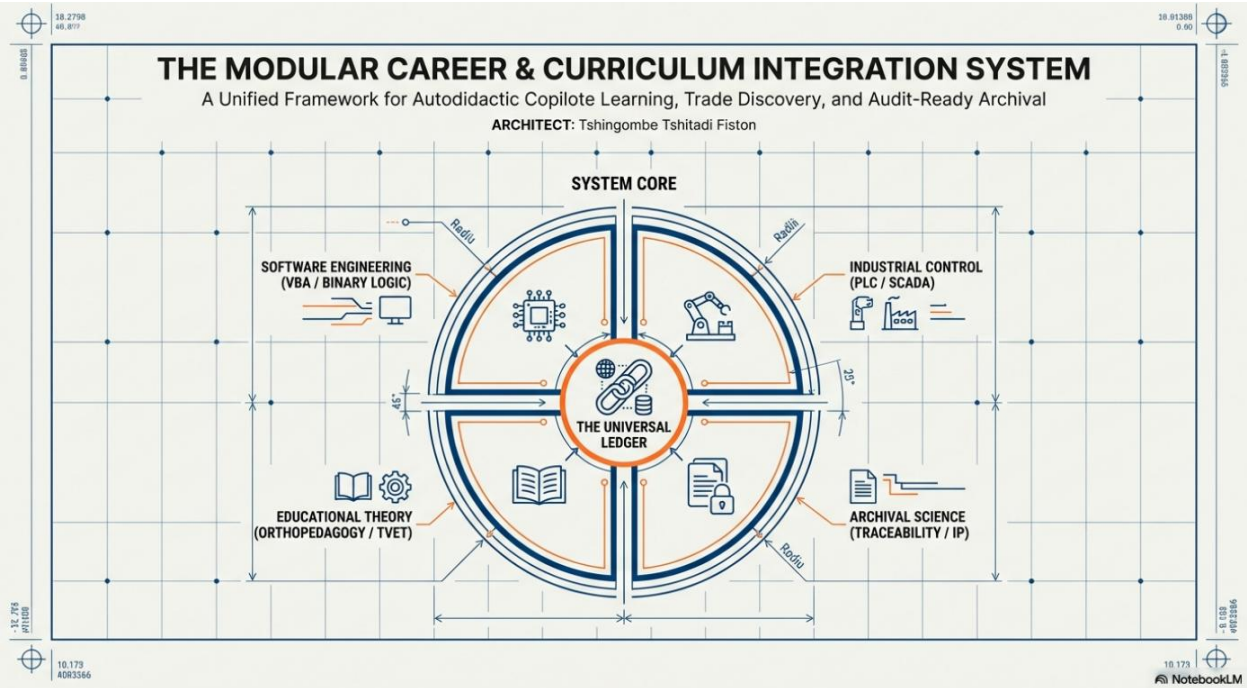
The "Living Document" Career

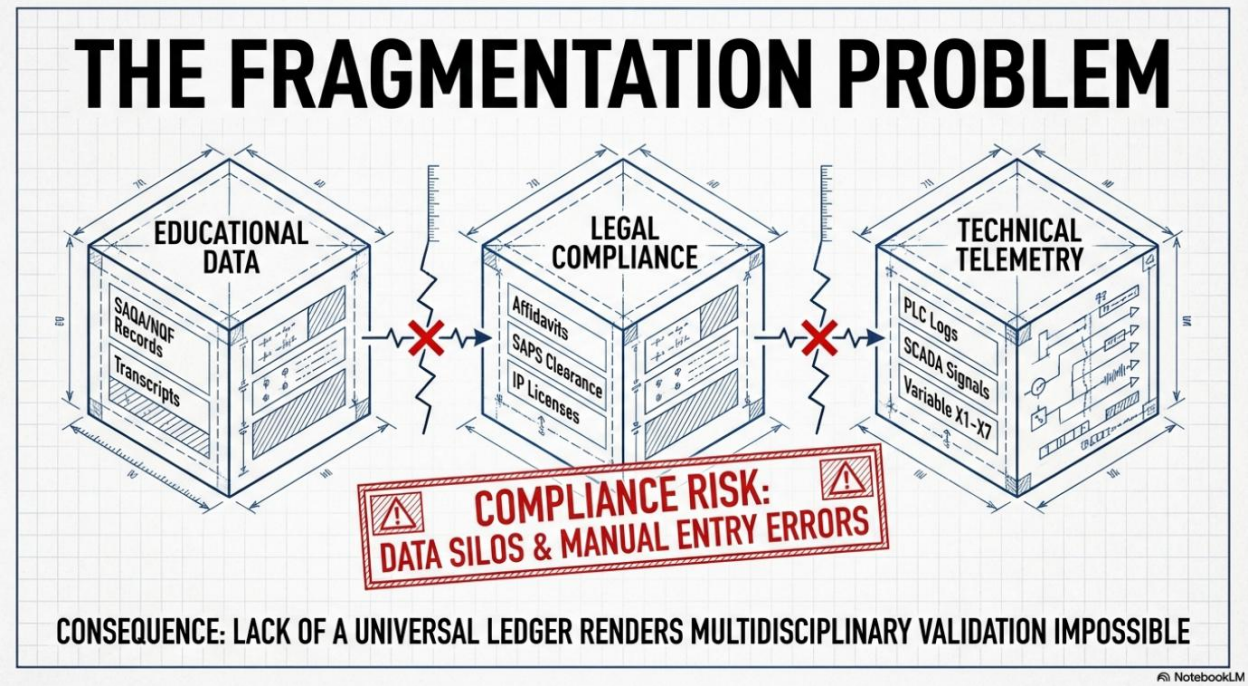
Viewing a career as a continuous synthesis of education, trade, and engineering practice.

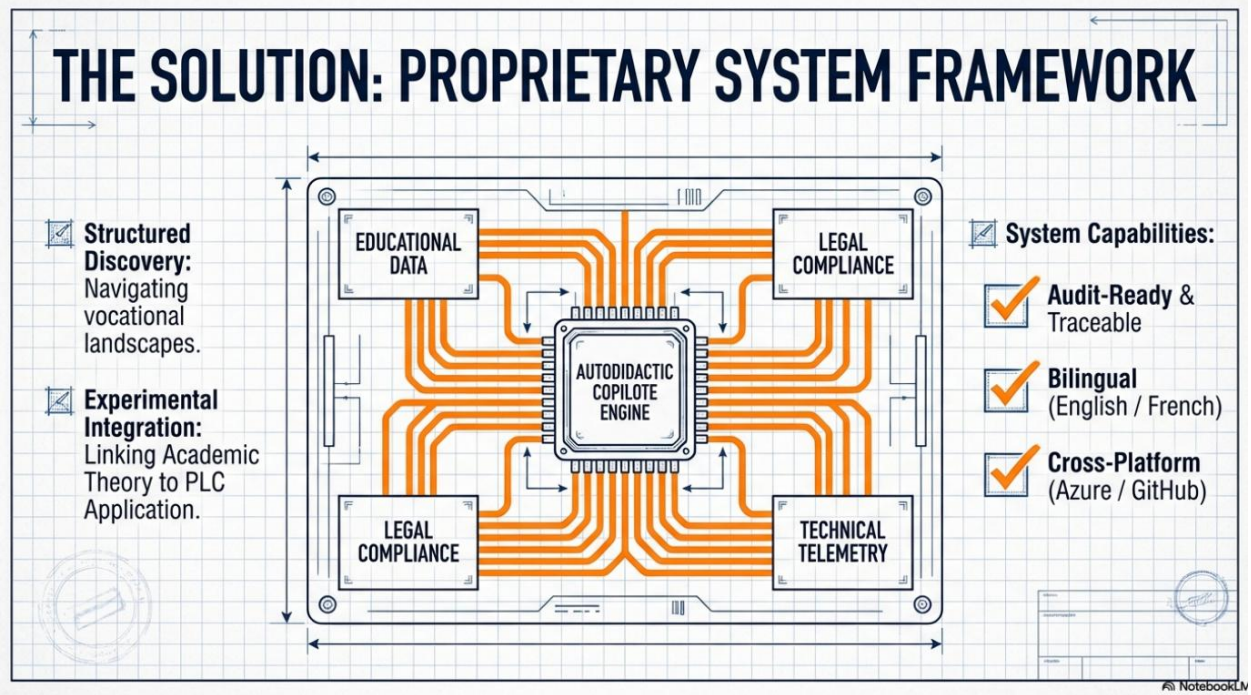


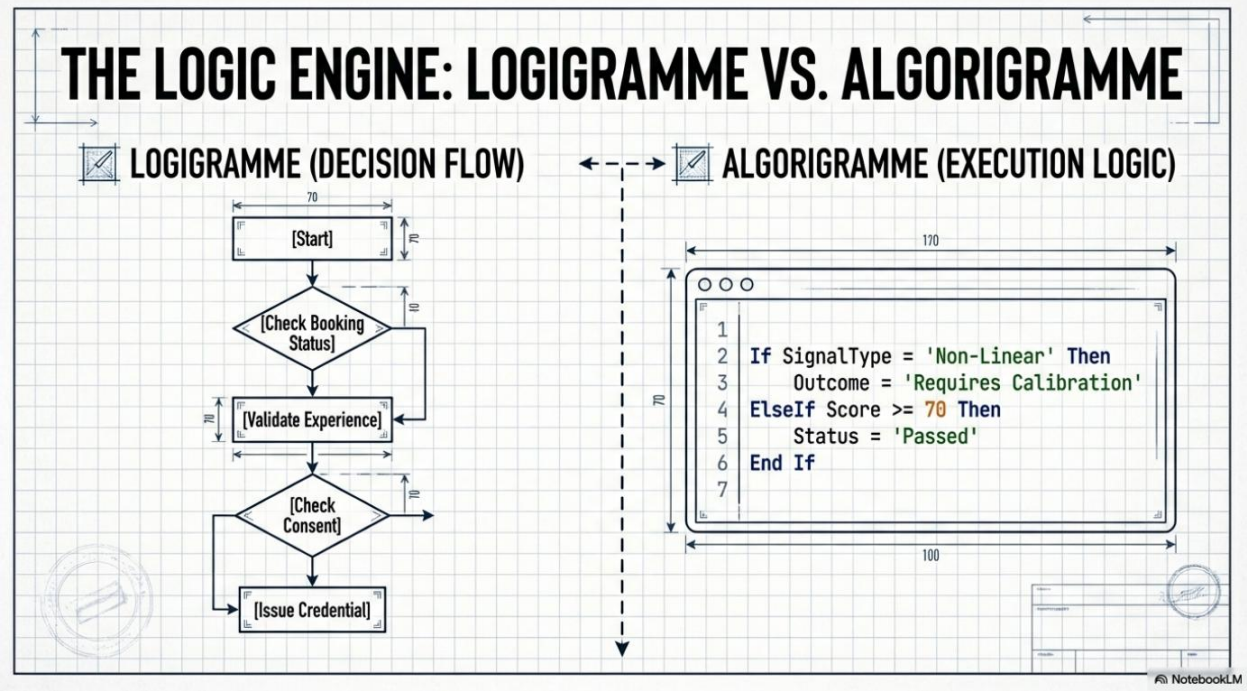
NotebookLM

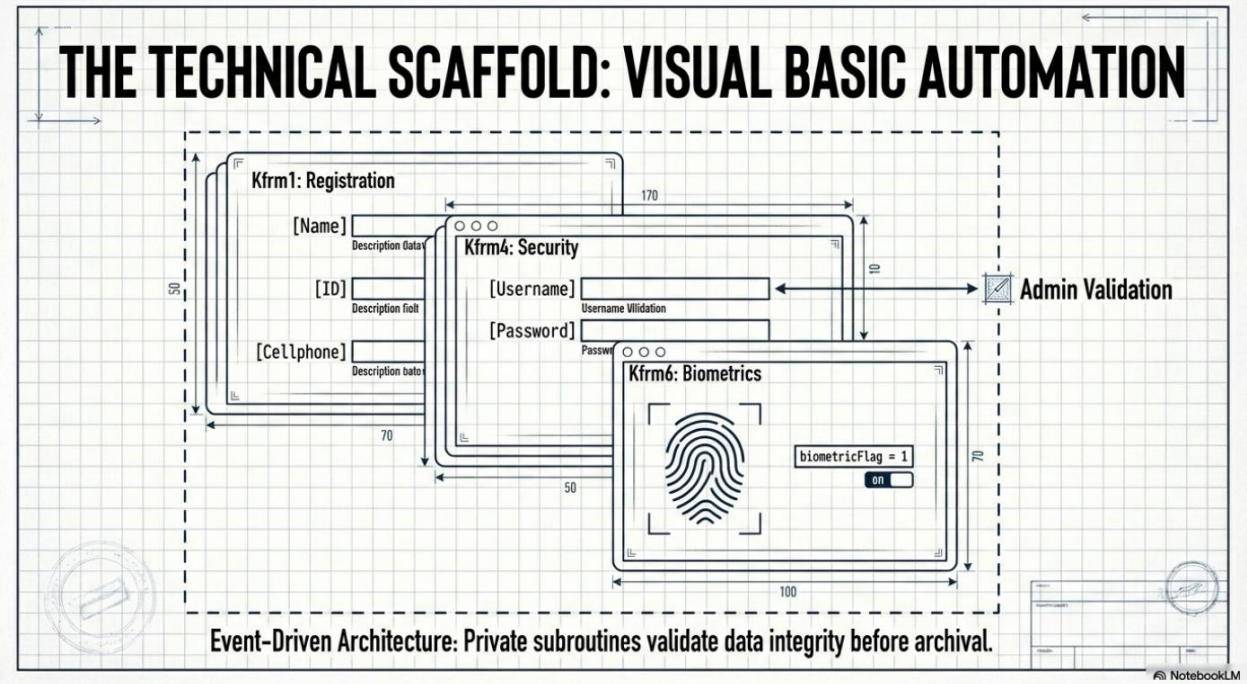

The Resilient Engineer: Navigating Technical Excellence and Bureaucratic Complexity
The Technical Frontier (Mastery)
The Systemic Frontier (Resilience)
Mathematics as a Living Language
Advanced calculus and transforms are essential for modeling real-world power systems and signal processing.
Heavy Current & Control Systems
Mastery spans from N1 foundational theory to N6 advanced circuit analysis and PID controllers.
PID
Comparing the Dual Worlds
Domain
Focus Areas
Key Regulatory Bodies
Technical
Circuits, Power Systems, Robotics
SABS, MIL-SPEC, ISO
Administrative
NQF Levels, RPL, Trade Tests
SAQA, DHET, QCTO
DELAYED
The Certification Backlog Challenge
Systemic delays and irregularities in qualification issuance require engineers to maintain rigorous 'Audit-Ready' documentation.
NATED Diplomas
Digital Certs
PoE (Evidence)
The 'Living Portfolio' Strategy
Success relies on a Portfolio of Evidence (PoE) combining NATED diplomas with modern digital certs.
MIL-STD & IPC
PID
International Standard Alignment
Compliance with MIL-STD and IPC ensures reliability in mission-critical and high-reliability industrial environments.
Azure
GitHub
AI Training
Cross-Disciplinary CPD
Integration of Azure, GitHub, and AI training alongside traditional engineering ensures global career adaptability.
NotebookLM

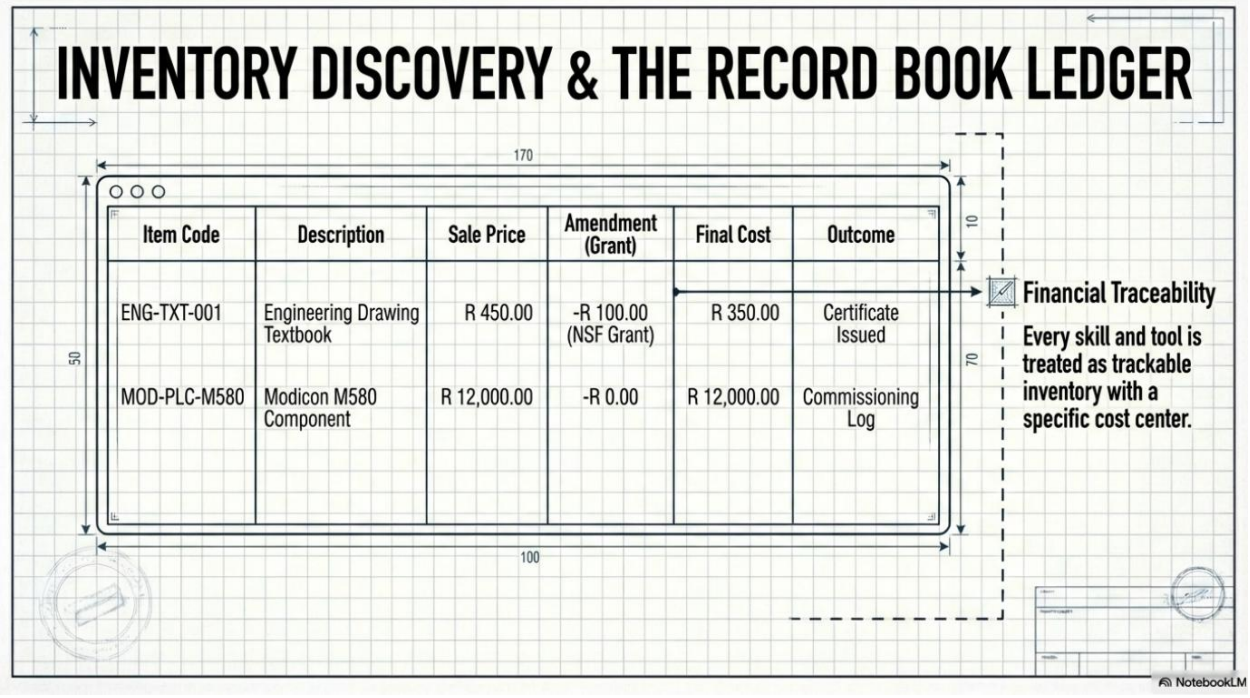

THE MODULAR CAREER & CURRICULUM INTEGRATION SYSTEM
A Unified Framework for Autodidactic Copilote Learning, Trade Discovery, and Audit-Ready Archival
ARCHITECT: Tshingombe Tshitadi Fiston
SYSTEM CORE
SOFTWARE ENGINEERING (VBA / BINARY LOGIC)
INDUSTRIAL CONTROL (PLC / SCADA)
THE UNIVERSAL LEDGER
EDUCATIONAL THEORY (ORTHOPEDAGOGY / TVET)
ARCHIVAL SCIENCE (TRACEABILITY / IP)
Radius
45°
25°
NotebookLM

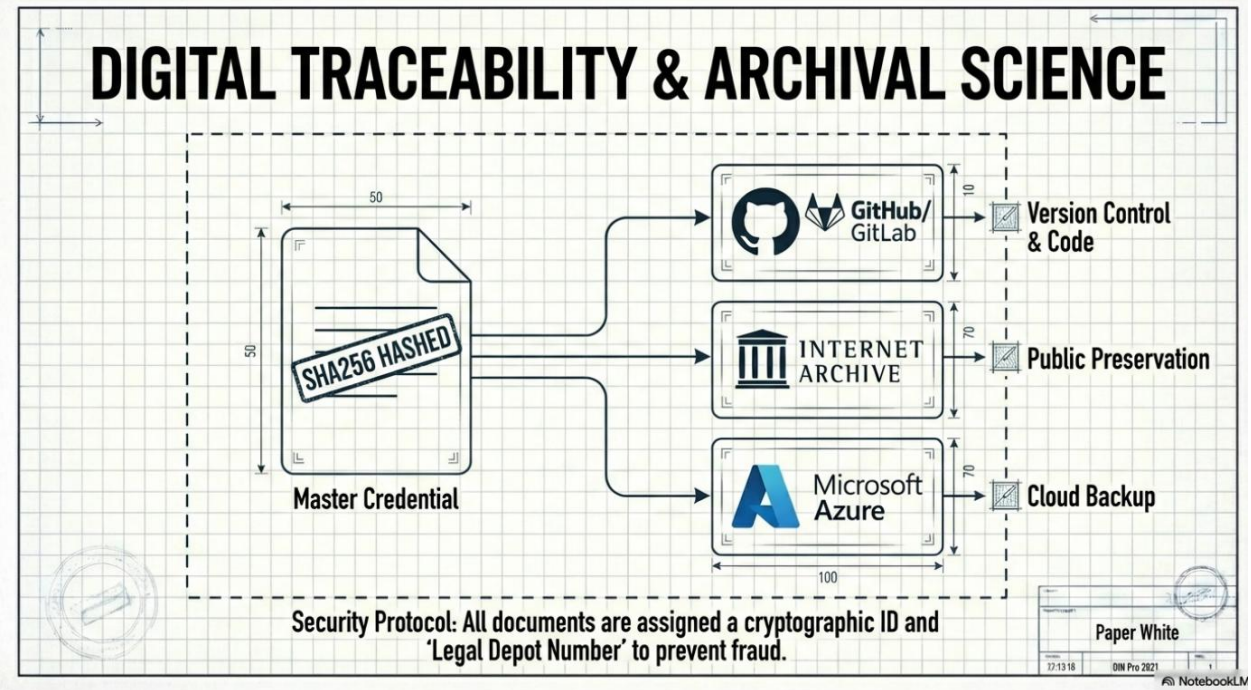

THE FRAGMENTATION PROBLEM
EDUCATIONAL DATA
SAQA/NQF Records
Transcripts
LEGAL COMPLIANCE
Affidavits
SAPS Clearance
IP Licenses
TECHNICAL TELEMETRY
PLC Logs
SCADA Signals
Variable X1-X7
COMPLIANCE RISK:
DATA SILOS & MANUAL ENTRY ERRORS
CONSEQUENCE: LACK OF A UNIVERSAL LEDGER RENDERS MULTIDISCIPLINARY VALIDATION IMPOSSIBLE
NotebookLM

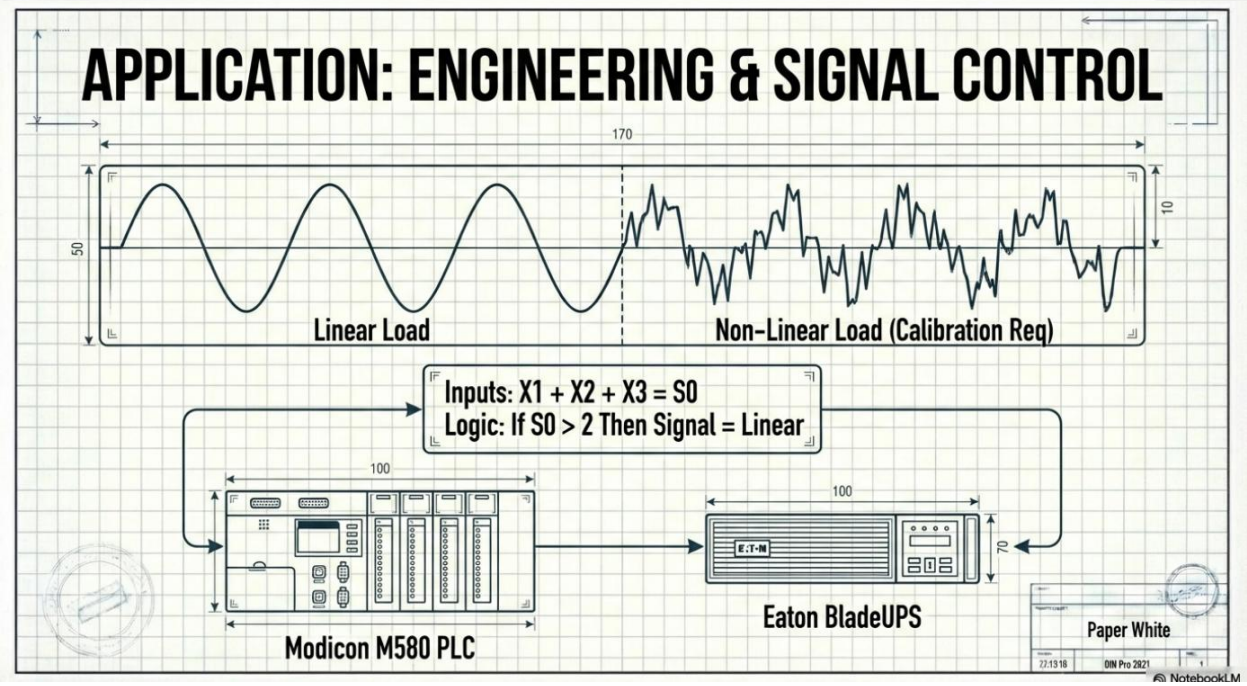

THE SOLUTION: PROPRIETARY SYSTEM FRAMEWORK
Structured Discovery: Navigating vocational landscapes.
Experimental Integration: Linking Academic Theory to PLC Application.
EDUCATIONAL DATA
LEGAL COMPLIANCE
AUTODIDACTIC COPILOTE ENGINE
LEGAL COMPLIANCE
TECHNICAL TELEMETRY
System Capabilities:
Audit-Ready & Traceable
Bilingual (English / French)
Cross-Platform (Azure / GitHub)
NotebookLM

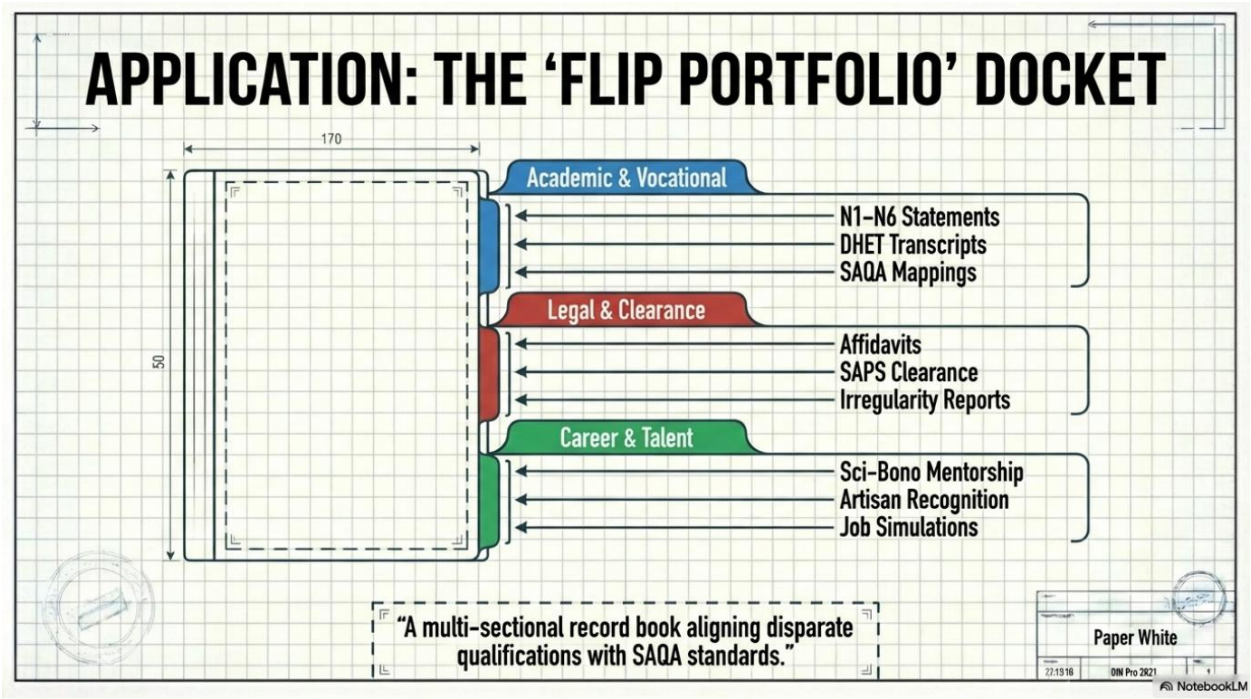

THE LOGIC ENGINE: LOGIGRAMME VS. ALGORIGRAMME
LOGIGRAMME (DECISION FLOW)
[Start]
[Check Booking Status]
[Validate Experience]
[Check Consent]
[Issue Credential]
ALGORIGRAMME (EXECUTION LOGIC)
If SignalType = 'Non-Linear' Then
Outcome = 'Requires Calibration'
ElseIf Score >= 70 Then
Status = 'Passed'
End If
NotebookLM

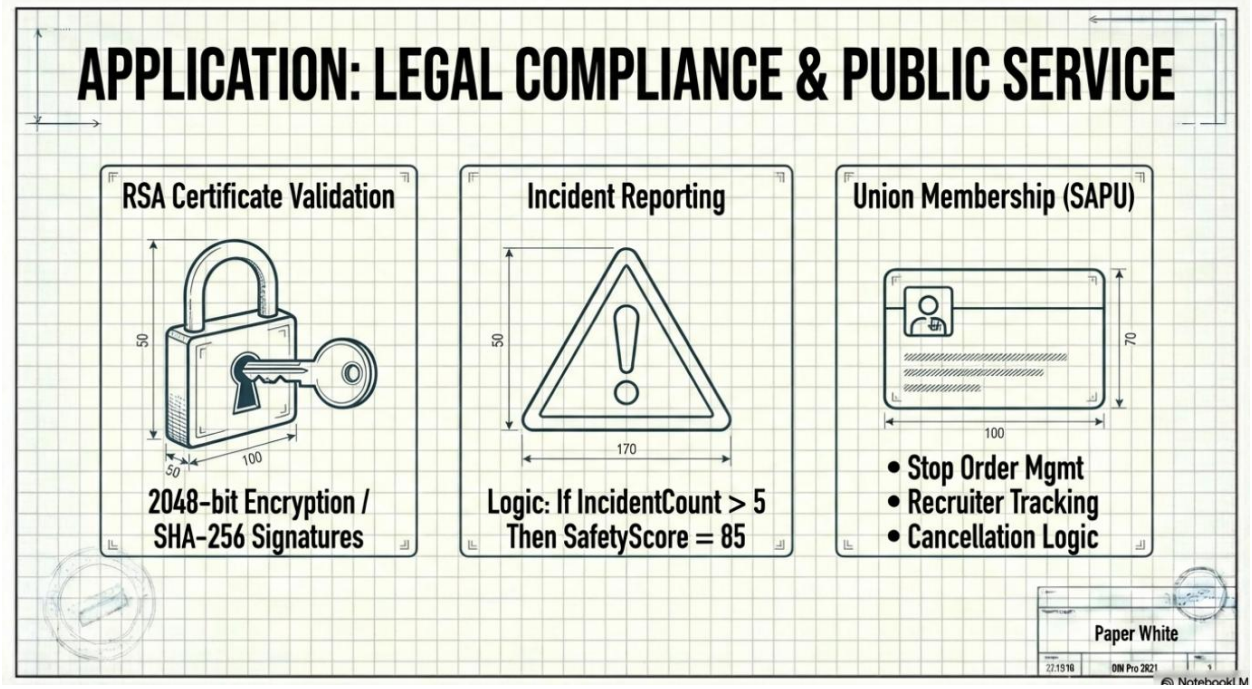

THE TECHNICAL SCAFFOLD: VISUAL BASIC AUTOMATION
Kfrm1: Registration
[Name]
[ID]
[Cellphone]
Kfrm4: Security
[Username]
[Password]
Admin Validation
Kfrm6: Biometrics
biometricFlag = 1
on
170
50
70
10
100
Event-Driven Architecture: Private subroutines validate data integrity before archival.
NotebookLM

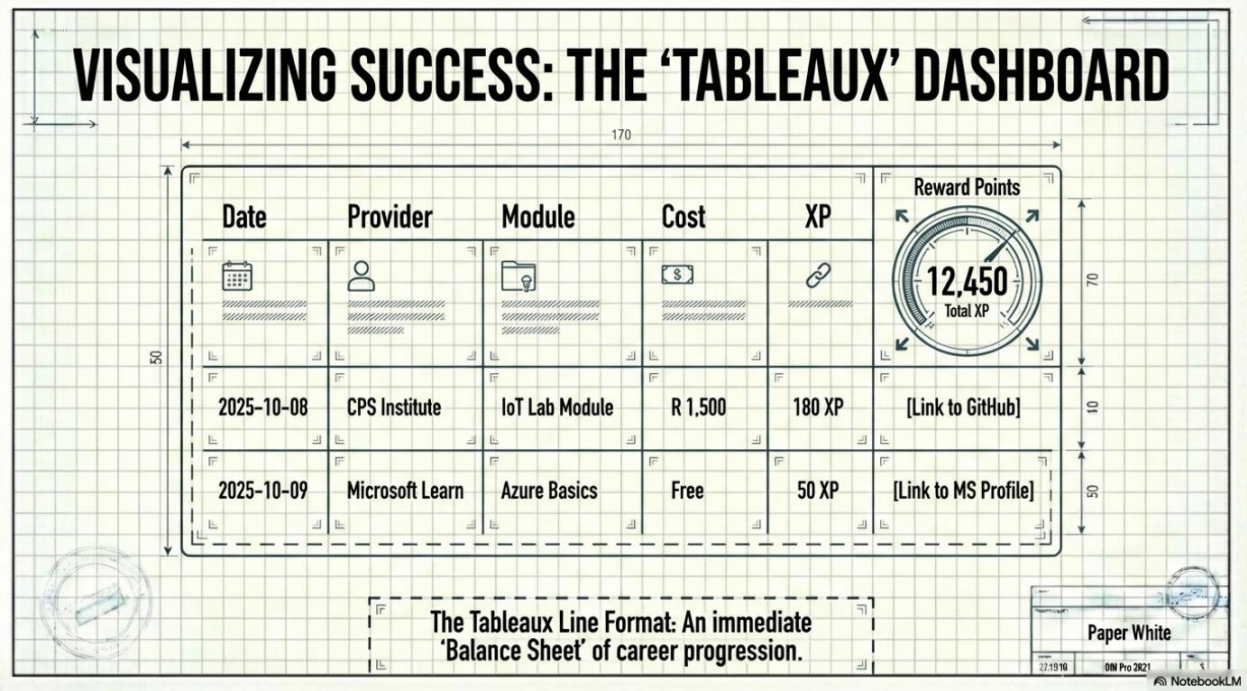

INVENTORY DISCOVERY & THE RECORD BOOK LEDGER
Item Code
Description
Sale Price
Amendment (Grant)
Final Cost
Outcome
ENG-TXT-001
Engineering Drawing Textbook
R 450.00
-R 100.00 (NSF Grant)
R 350.00
Certificate Issued
MOD-PLC-M580
Modicon M580 Component
R 12,000.00
-R 0.00
R 12,000.00
Commissioning Log
Financial Traceability
Every skill and tool is treated as trackable inventory with a specific cost center.
170
50
70
10
100
NotebookLM

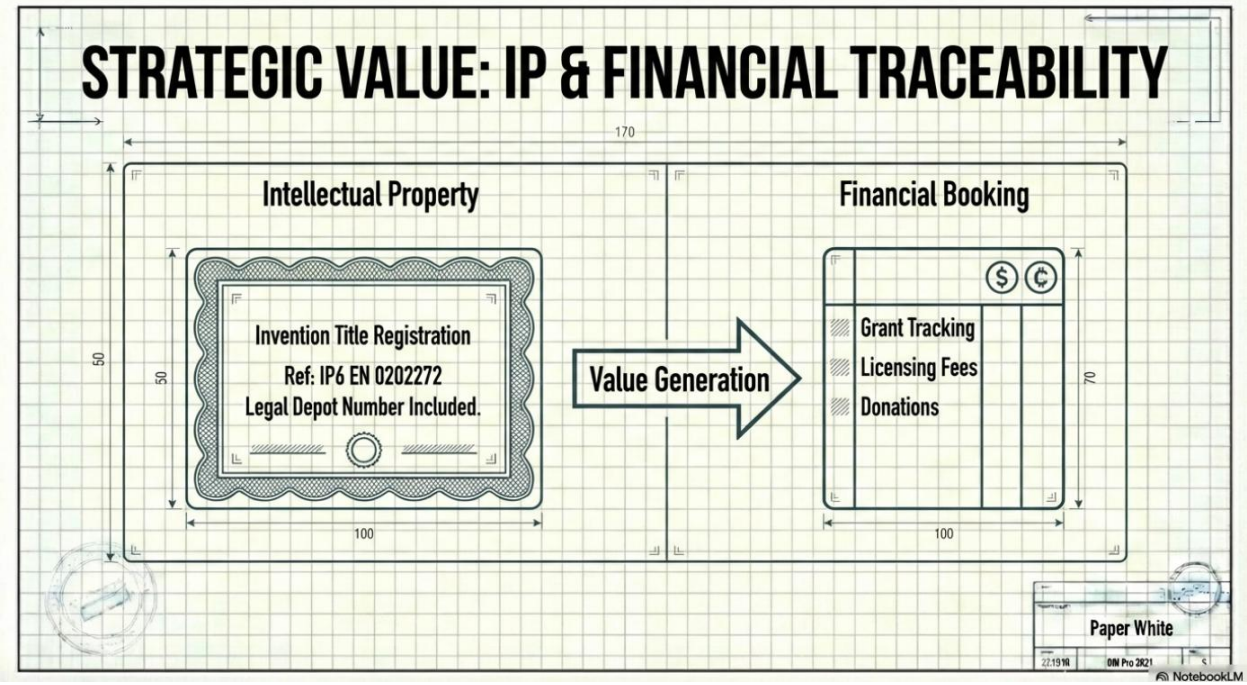

DIGITAL TRACEABILITY & ARCHIVAL SCIENCE
50
50
SHA256 HASHED
Master Credential
GitHub/ GitLab
10
Version Control & Code
INTERNET ARCHIVE
70
Public Preservation
Microsoft Azure
70
Cloud Backup
100
Security Protocol: All documents are assigned a cryptographic ID and 'Legal Depot Number' to prevent fraud.
Paper White
NotebookLM

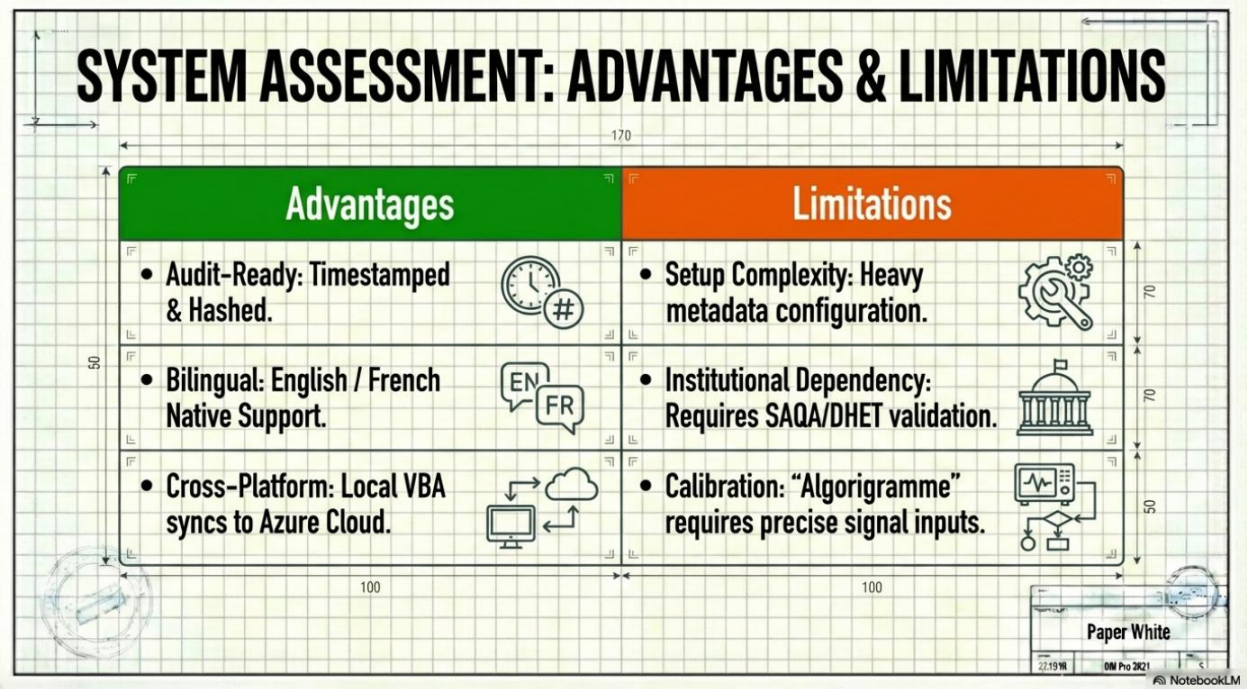

APPLICATION: ENGINEERING & SIGNAL CONTROL
170
50
10
Linear Load
Non-Linear Load (Calibration Req)
Inputs: X1 + X2 + X3 = S0
Logic: If S0 > 2 Then Signal = Linear
100
Modicon M580 PLC
100
70
Eaton BladeUPS
Paper White
NotebookLM

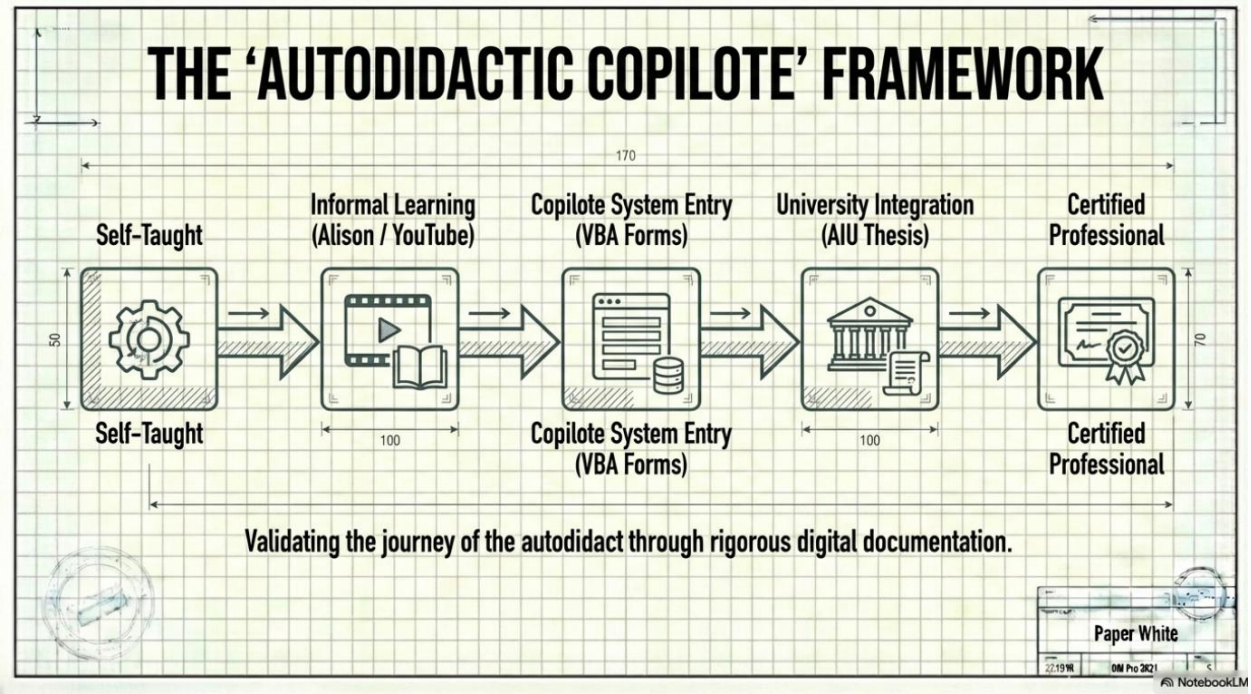

APPLICATION: THE 'FLIP PORTFOLIO' DOCKET
170
50
Academic & Vocational
N1–N6 Statements
DHET Transcripts
SAQA Mappings
Legal & Clearance
Affidavits
SAPS Clearance
Irregularity Reports
Career & Talent
Sci-Bono Mentorship
Artisan Recognition
Job Simulations
"A multi-sectional record book aligning disparate qualifications with SAQA standards."
Paper White
DIN Pro 2021
NotebookLM

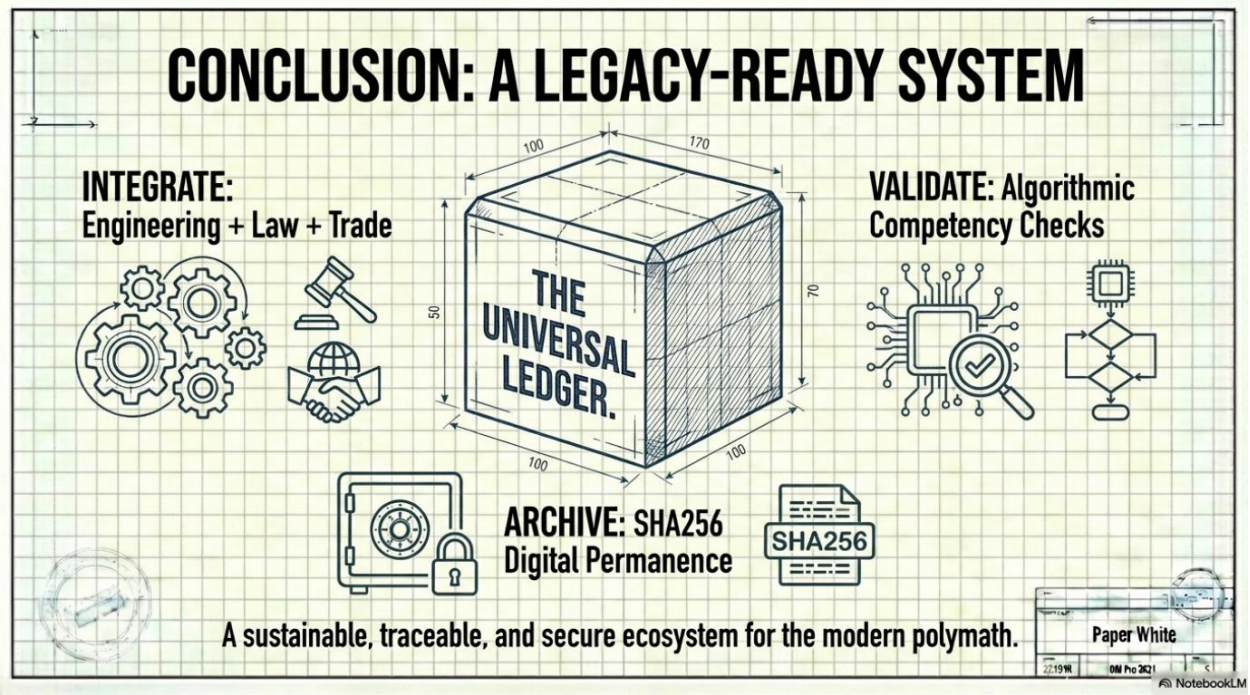

APPLICATION: LEGAL COMPLIANCE & PUBLIC SERVICE
RSA Certificate Validation
50
100
50
2048-bit Encryption / SHA-256 Signatures
Incident Reporting
50
170
Logic: If IncidentCount > 5 Then SafetyScore = 85
Union Membership (SAPU)
70
100
• Stop Order Mgmt
• Recruiter Tracking
• Cancellation Logic
Paper White
DIN Pro 2021
NotebookLM


VISUALIZING SUCCESS: THE 'TABLEAUX' DASHBOARD
170
50
Date
Provider
Module
Cost
XP
Reward Points
12,450
Total XP
70
2025-10-08
CPS Institute
IoT Lab Module
R 1,500
180 XP
[Link to GitHub]
10
2025-10-09
Microsoft Learn
Azure Basics
Free
50 XP
[Link to MS Profile]
50
The Tableaux Line Format: An immediate 'Balance Sheet' of career progression.
Paper White
NotebookLM


STRATEGIC VALUE: IP & FINANCIAL TRACEABILITY
170
Intellectual Property
Financial Booking
50
50
Invention Title Registration
Ref: IP6 EN 0202272
Legal Depot Number Included.
100
Value Generation
Grant Tracking
Licensing Fees
Donations
70
100
Paper White
NotebookLM

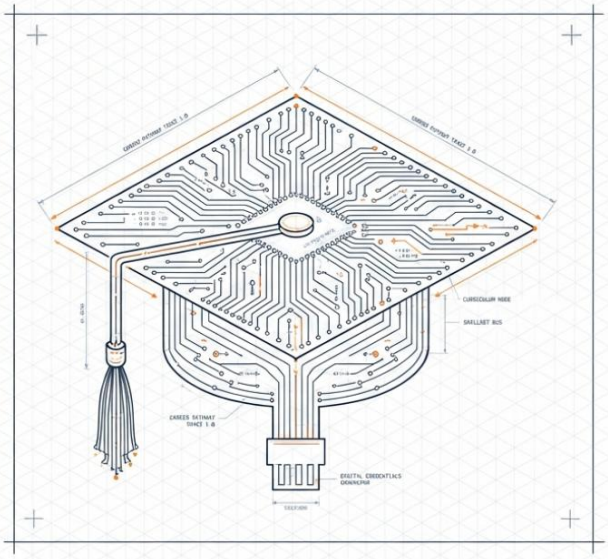

SYSTEM ASSESSMENT: ADVANTAGES & LIMITATIONS
Advantages
Limitations
• Audit-Ready: Timestamped & Hashed.
• Setup Complexity: Heavy metadata configuration.
• Bilingual: English / French Native Support.
EN
FR
• Institutional Dependency: Requires SAQA/DHET validation.
• Cross-Platform: Local VBA syncs to Azure Cloud.
• Calibration: "Algorigramme" requires precise signal inputs.
170
50
70
70
50
100
100
Paper White
NotebookLM


THE 'AUTODIDACTIC COPILOTE' FRAMEWORK
170
Self-Taught
Informal Learning (Alison / YouTube)
Copilote System Entry (VBA Forms)
University Integration (AIU Thesis)
Certified Professional
50
70
100
100
Self-Taught
Copilote System Entry (VBA Forms)
Certified Professional
Validating the journey of the autodidact through rigorous digital documentation.
Paper White
NotebookLM



THE MODULAR CAREER & CURRICULUM INTEGRATION SYSTEM

A Framework for Lifelong Talent Development, Trade Discovery, and Digital Traceability



Architect: Tshingombe Tshitadi Fiston

Application Trade Discovery: Job Education Research Methodology, Operational Autodidactic Copilote Distance

NotebookLM

Executive Abstract: The Autodidactic Copilote System

A unified framework merging job education, research methodology, and distance learning into a single, audit-ready career footprint. The system acts as a 'Copilote' for navigating complex vocational landscapes.

Traceability

Creating a digitally verifiable career history using `SHA256` hashing and `RSA` metadata.

Integration

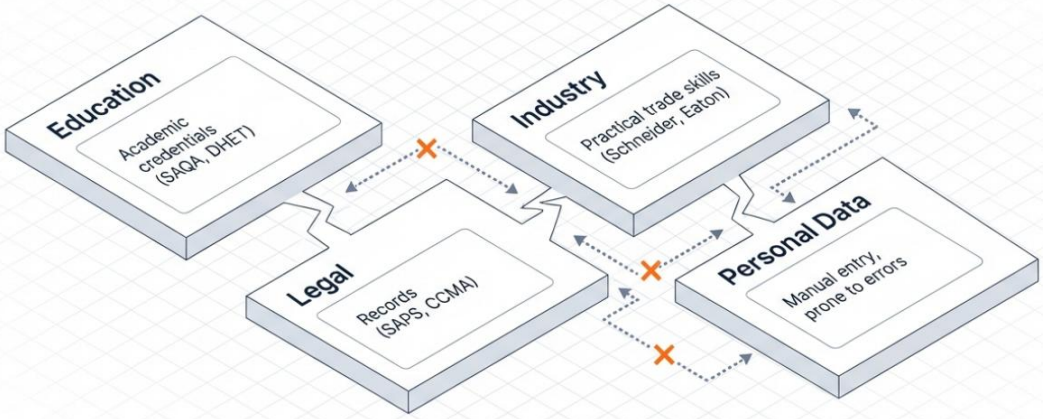
Bridging the gap between academic theory (`TVET/NATED`) and practical trade application (`PLC/SCADA`).

Legacy

Preserving intellectual property and credentials through '`Flip Portfolio Docket`' architecture.

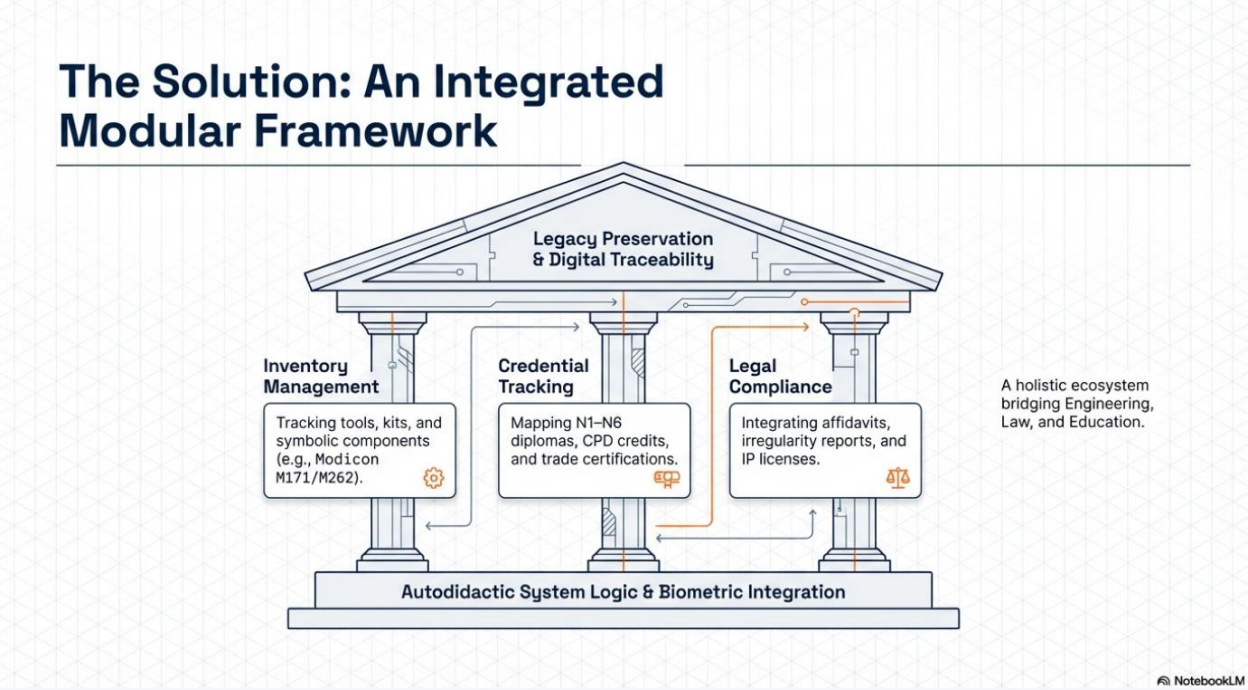
NotebookLM

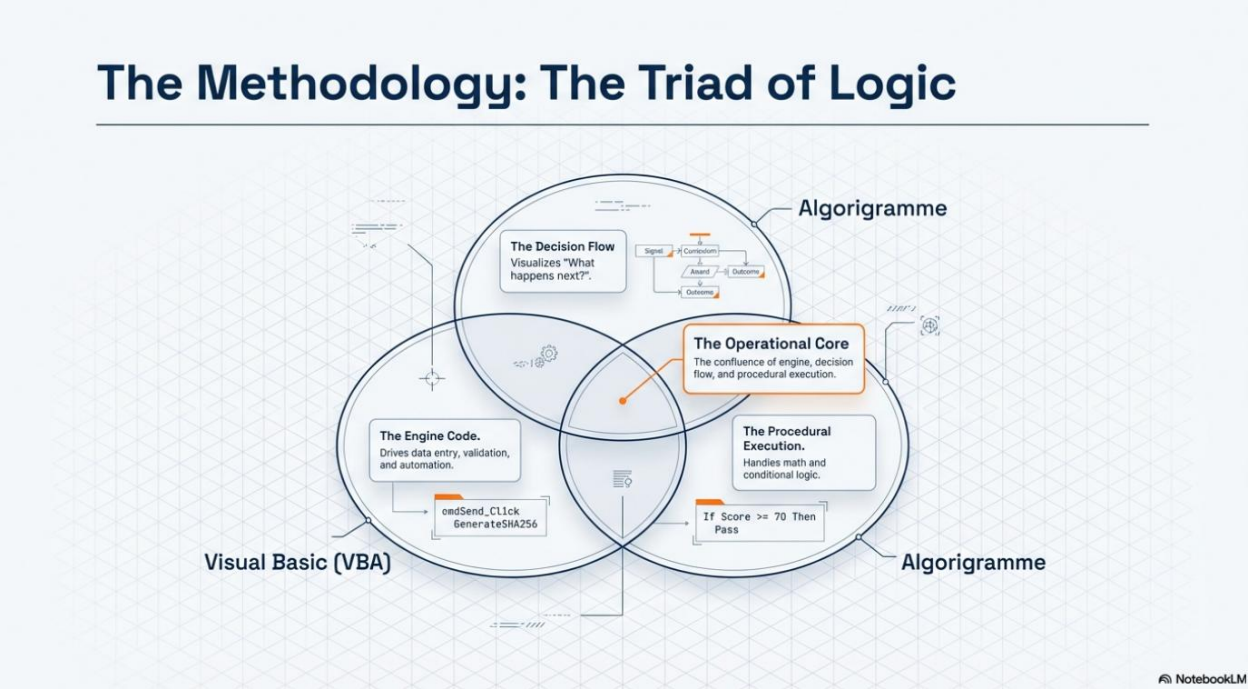
The Problem: A Fragmented Career Landscape



Traditional systems lack modularity, biometric integration, and audit-readiness. Manual data entry leads to errors, delays in diploma issuance, and compliance risks.

NotebookLM


The Solution: An Integrated Modular Framework
Legacy Preservation & Digital Traceability
Inventory Management
Tracking tools, kits, and symbolic components (e.g., Modicon M171/M262).
Credential Tracking
Mapping N1–N6 diplomas, CPD credits, and trade certifications.
Legal Compliance
Integrating affidavits, irregularity reports, and IP licenses.
Autodidactic System Logic & Biometric Integration
A holistic ecosystem bridging Engineering, Law, and Education.
NotebookLM

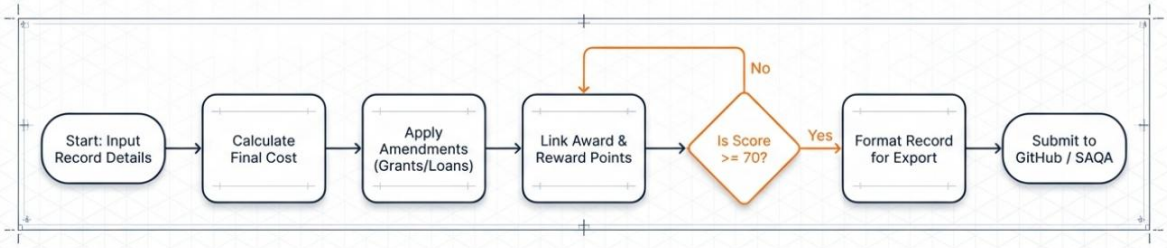

The Methodology: The Triad of Logic
Algorigramme
The Decision Flow
Visualizes "What happens next?".
The Operational Core
The confluence of engine, decision flow, and procedural execution.
The Engine Code.
Drives data entry, validation, and automation.
cmdSend_Click
GenerateSHA256
The Procedural Execution.
Handles math and conditional logic.
If Score >= 70 Then
Pass
Visual Basic (VBA)
Algorigramme
NotebookLM

System Architecture: The Input Layer (Kfrm Modules)

- **Kfrm1–Kfrm2:** Registration & Demographics
- **Kfrm3–Kfrm4:** Credential Setup & Login
- **Kfrm5–Kfrm6:** Biometric & Inventory Discovery
- **Security:** Input masks and validation checks preventing empty fields.

NotebookLM

Deep Dive: The Logigramme (Decision Logic)



Workflow Example: Certificate Issuance Signal Pathway (Signal -> Curriculum -> Award -> Outcome)

NotebookLM

Deep Dive: The Algorigramme (Procedural Logic)

Cost Calculation Logic

```
Function CalculateFinalCost(salePrice, amendment)
    CalculateFinalCost = salePrice + amendment
End Function
```

Credential Status Determination

```
Function DetermineCredentialStatus(issueDate, expiryDate)
    If Date > expiryDate Then Status = 'Expired'
    Else Status = 'Active'
End Function
```

Project Statuur Logic

```
Function DetermineCredentialStatus(issueDate, expiryDate)
    If Date > expiryDate Then Status = 'Expired'
    Else Status = 'Active'
End Function
```

Project Time Integral

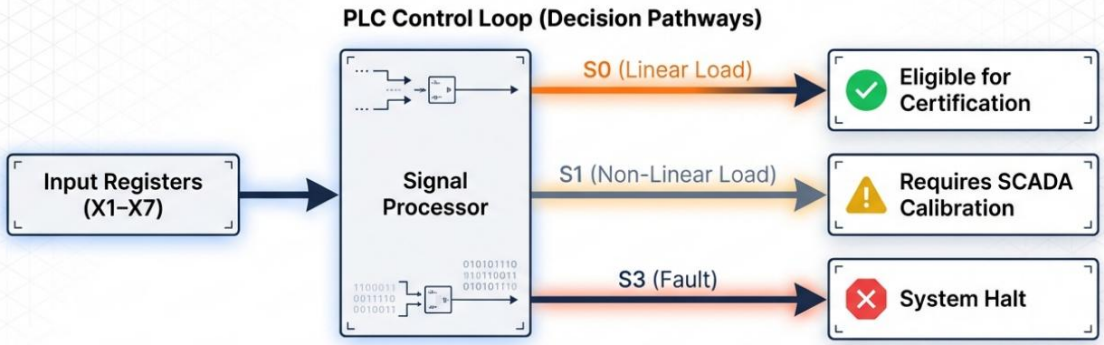
$$T = \int_0^N t_i \, di$$

(Total Project Time calculation based on accumulated task durations)

Execution logic for Linear vs. Non-linear Loads determining certification eligibility.

NotebookLM

Application Domain A: Engineering & Automation

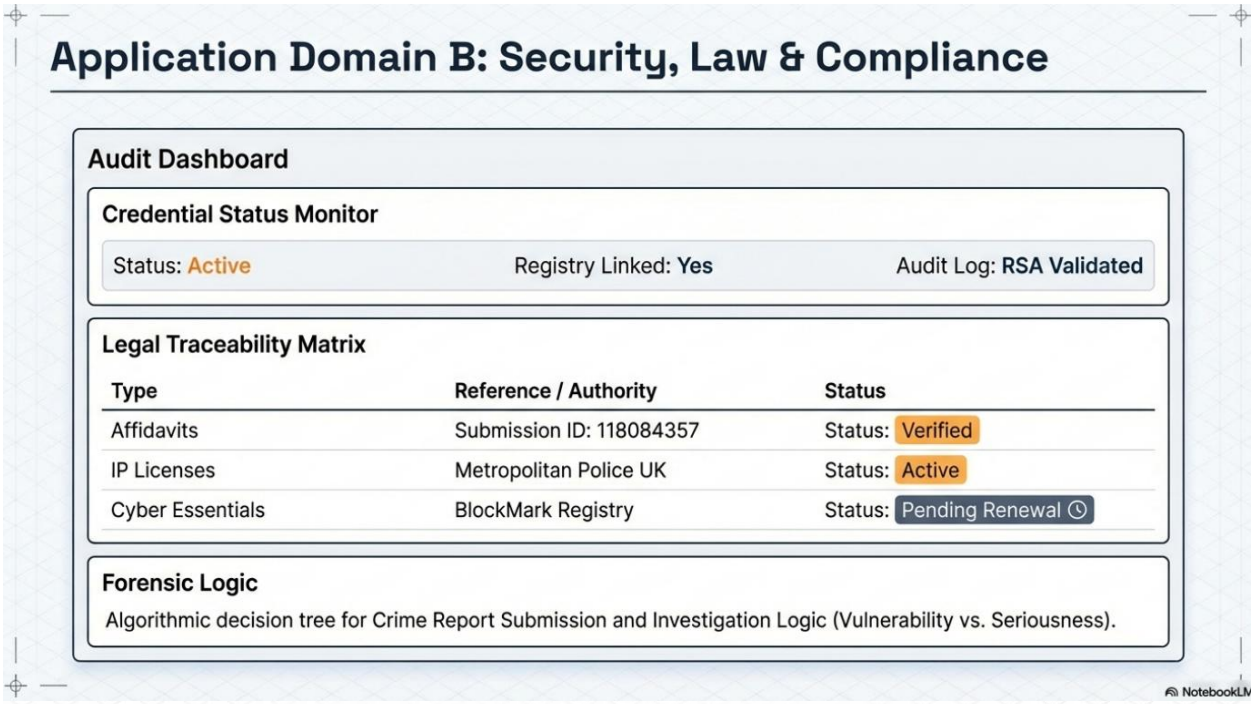


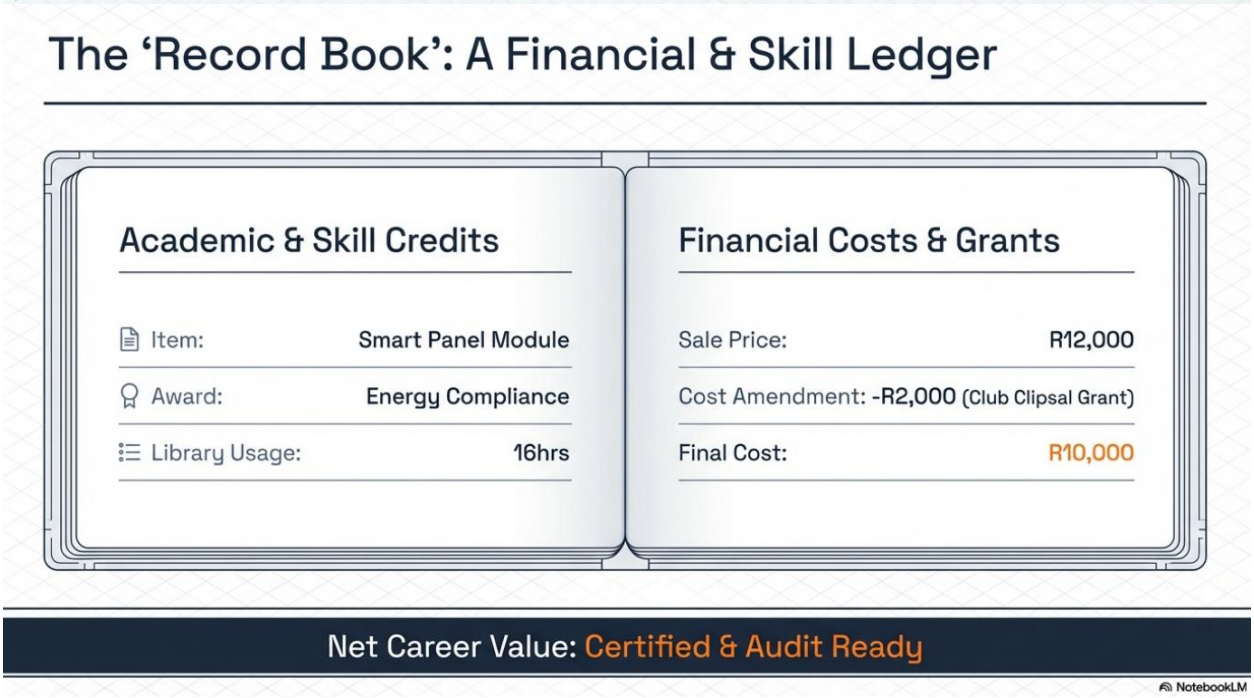
Integration Points

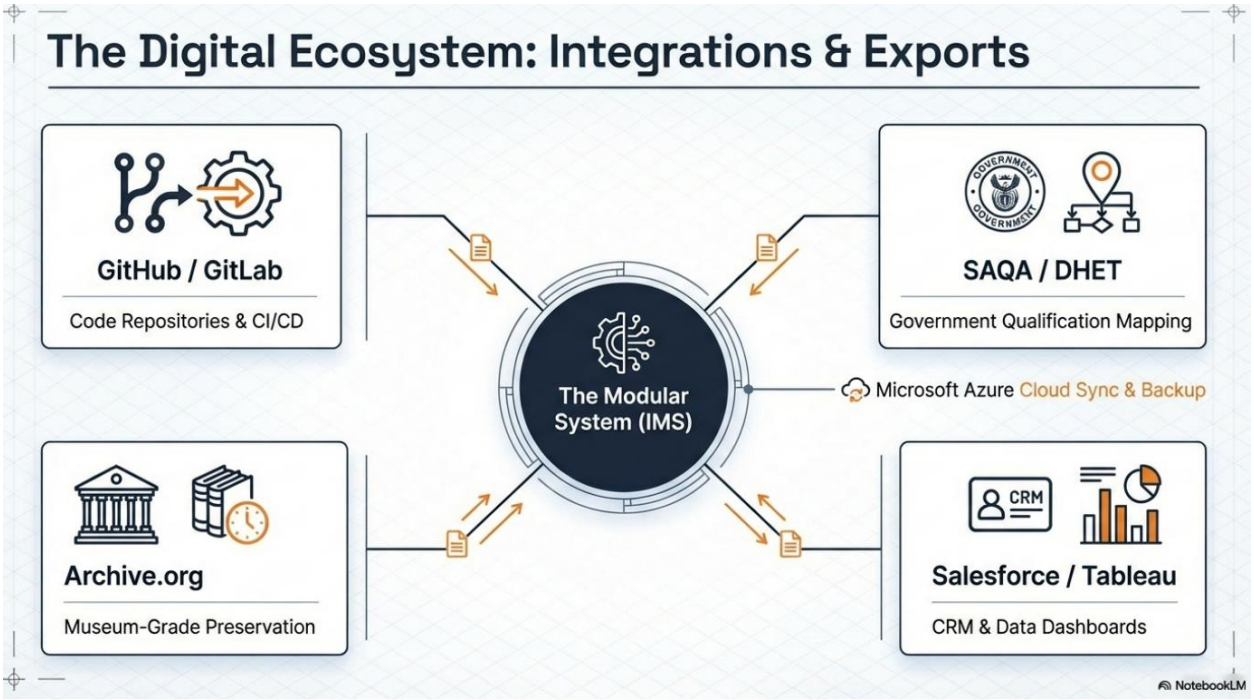
- **PLC Systems:** Modicon M580/M660 & Schneider Electric.
- **ATM Logic:** Card Reader -> Encryption -> Transaction simulation.
- **Energy Grid:** Real-time validation of competence.

— Architecture Diagram for Automated Decisioning across Industrial and Financial Systems.

NotebookLM


Application Domain B: Security, Law & Compliance
Audit Dashboard
Credential Status Monitor
Status: Active
Registry Linked: Yes
Audit Log: RSA Validated
Legal Traceability Matrix
Type
Reference / Authority
Status
Affidavits
Submission ID: 118084357
Status: Verified
IP Licenses
Metropolitan Police UK
Status: Active
Cyber Essentials
BlockMark Registry
Status: Pending Renewal
Forensic Logic
Algorithmic decision tree for Crime Report Submission and Investigation Logic (Vulnerability vs. Seriousness).
NotebookLM


The 'Record Book': A Financial & Skill Ledger
Academic & Skill Credits
Item:
Smart Panel Module
Award:
Energy Compliance
Library Usage:
16hrs
Financial Costs & Grants
Sale Price:
R12,000
Cost Amendment: -R2,000 (Club Clipsal Grant)
Final Cost:
R10,000
Net Career Value: Certified & Audit Ready
NotebookLM



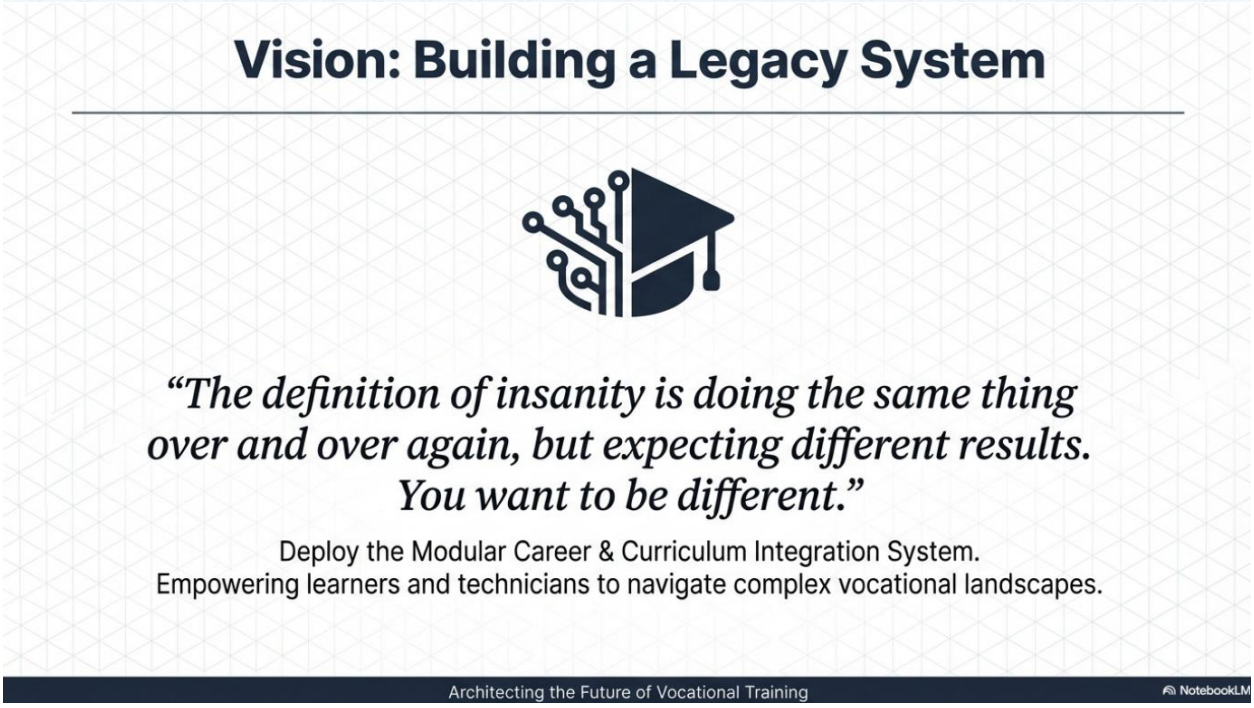
The Credential Dashboard & Tableaux Format

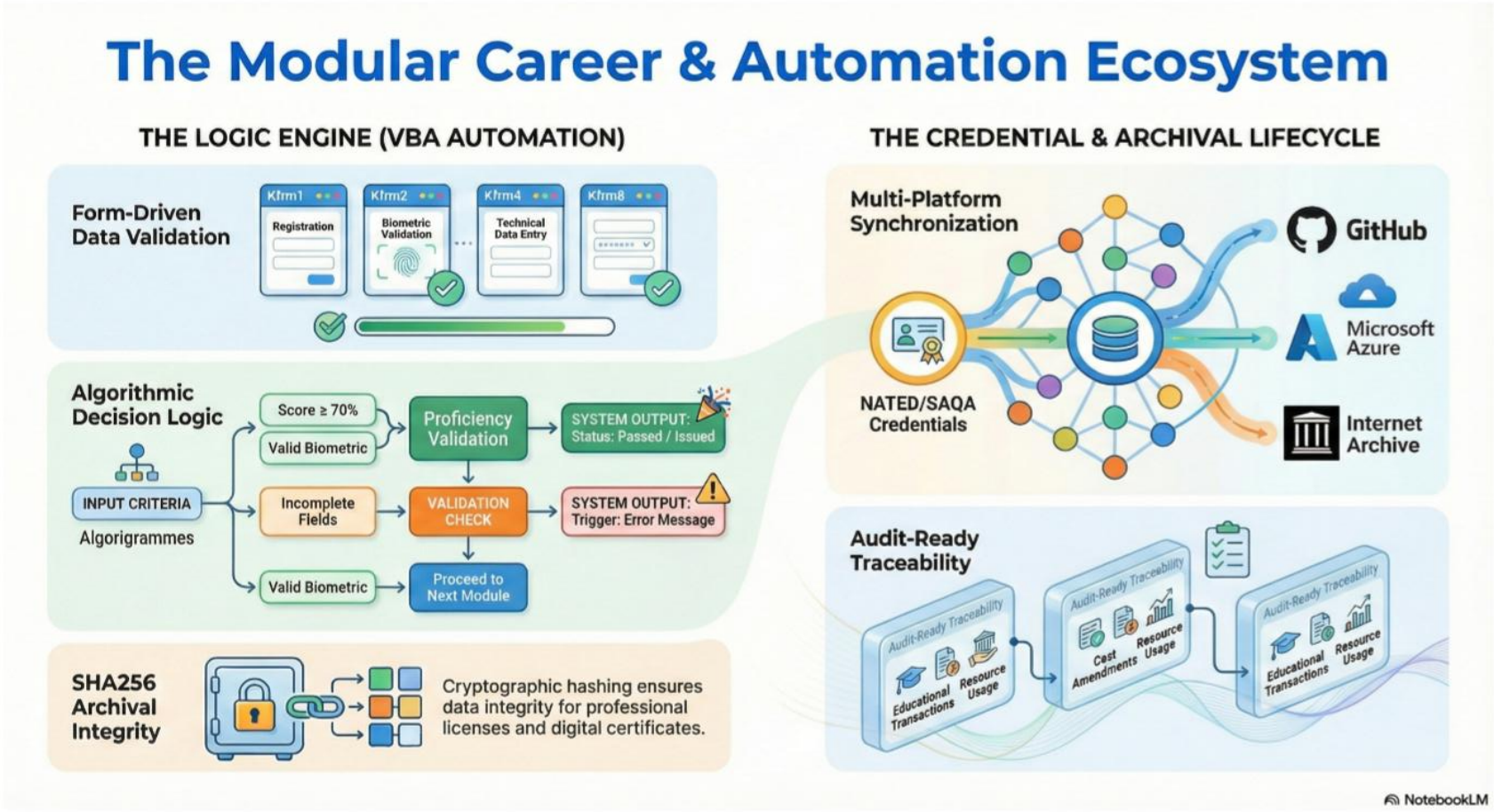
Date	Institution	Module/Item	Financials	Reward Points	Integration
2025-10-08	InfraTech Academy	IoT in Infrastructure Management	Cost: R12,000 | Grant: -R2,000	160 pts	GitHub + SAQA/NQF
2025-11-12	St Peace College	N4 Engineering Science	Cost: R800	N/A	DHET Archive

Net Career Value: Certified & Audit Ready

NotebookLM

Strategic Value & System Advantages
Traceability
Cross-platform audit trails ensure verifiable history using SHA256 hashing.
Modularity
Adaptable framework fits any industry, from Engineering to Security to Law.
Bilingual Support
Built-in architecture for English/French dual-language deployment.
Legacy Preservation
Ensures intellectual property and credentials are permanently archived and recoverable.
NotebookLM


Vision: Building a Legacy System
"The definition of insanity is doing the same thing over and over again, but expecting different results. You want to be different."
Deploy the Modular Career & Curriculum Integration System.
Empowering learners and technicians to navigate complex vocational landscapes.
Architecting the Future of Vocational Training
NotebookLM


The Modular Career & Automation Ecosystem
THE LOGIC ENGINE (VBA AUTOMATION)
THE CREDENTIAL & ARCHIVAL LIFECYCLE
Form-Driven Data Validation
Kfrm1
Registration
Kfrm2
Biometric Validation
Kfrm4
Technical Data Entry
Kfrm8
Algorithmic Decision Logic
INPUT CRITERIA
Algorigrammes
Score ≥ 70%
Valid Biometric
Proficiency Validation
SYSTEM OUTPUT: Status: Passed / Issued
Incomplete Fields
VALIDATION CHECK
SYSTEM OUTPUT: Trigger: Error Message
Valid Biometric
Proceed to Next Module
SHA256 Archival Integrity
Cryptographic hashing ensures data integrity for professional licenses and digital certificates.
Multi-Platform Synchronization
NATED/SAQA Credentials
GitHub
Microsoft Azure
Internet Archive
Audit-Ready Traceability
Audit-Ready Traceability
Educational Transactions
Resource Usage
Audit-Ready Traceability
Cost Amendments
Resource Usage
Audit-Ready Traceability
Educational Transactions
Resource Usage
NotebookLM

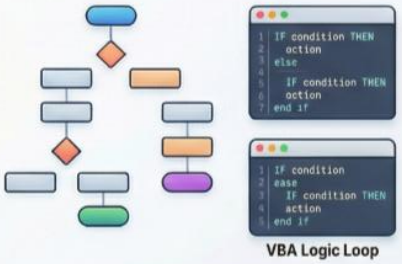
The Modular Career & Technical Integration Framework

This framework proposes a modular ecosystem that merges "**Trade Discovery**" with "**Signal Control**," using Visual Basic (VBA) logic to automate the transition from educational inputs to professional certifications and legally traceable digital archives.

The Signal-to-Outcome Pipeline

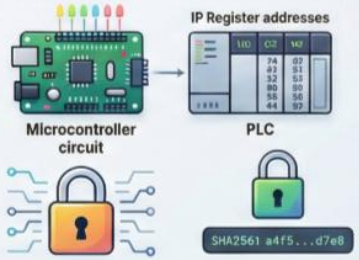
Career Signal | Subjects & Curriculum | Award and Entry

The Logic of Technical Discovery



VBA Logic Loop

Logigrammes & Algorigrammes
Automated decision-making an fault diagnostics



Modular Programming Modules
Secure identification

Integration, Audit & Archiving

Cross-Platform Traceability

100+

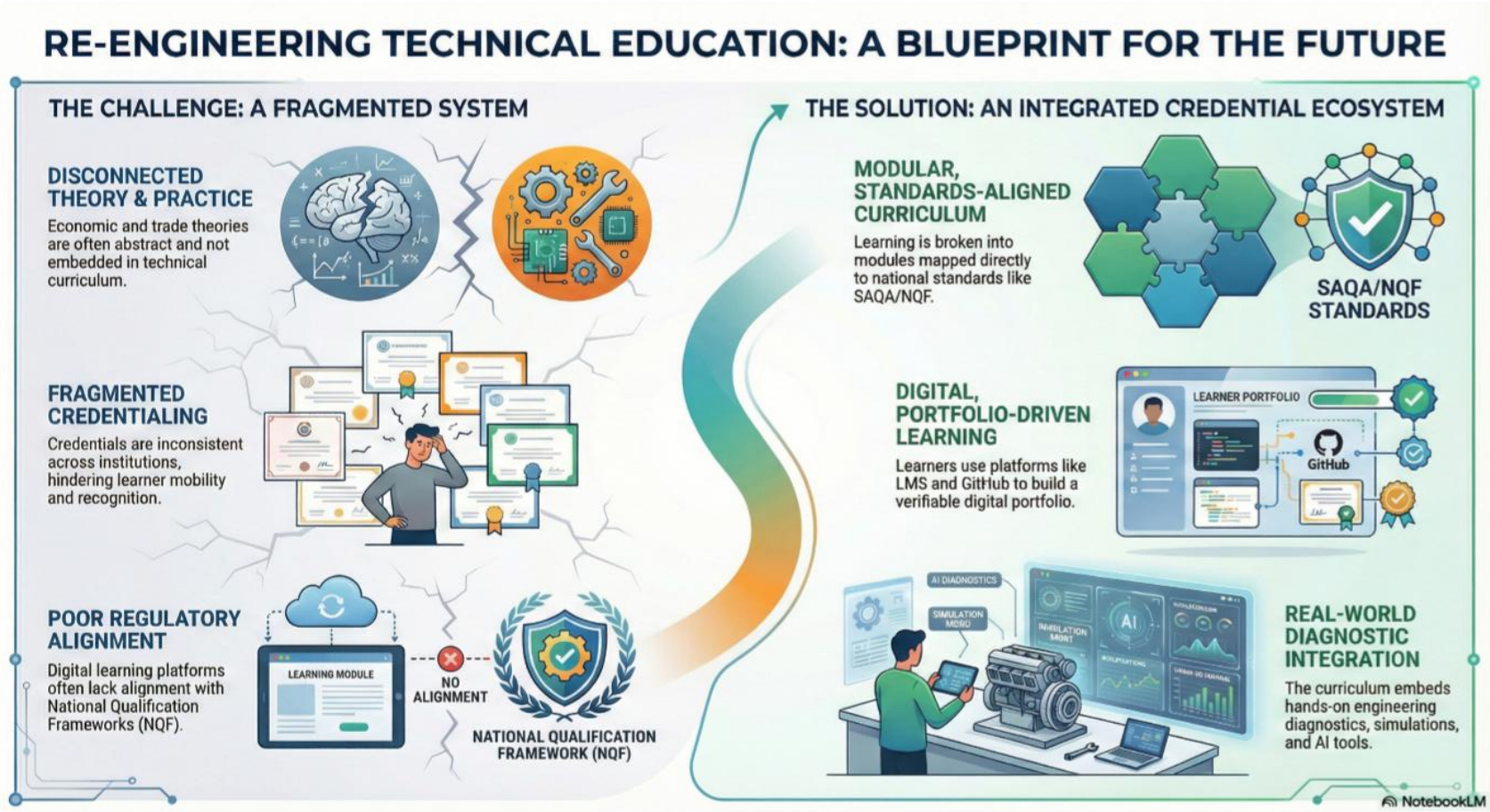
Published technical items with over **2,600 views** on key artifacts

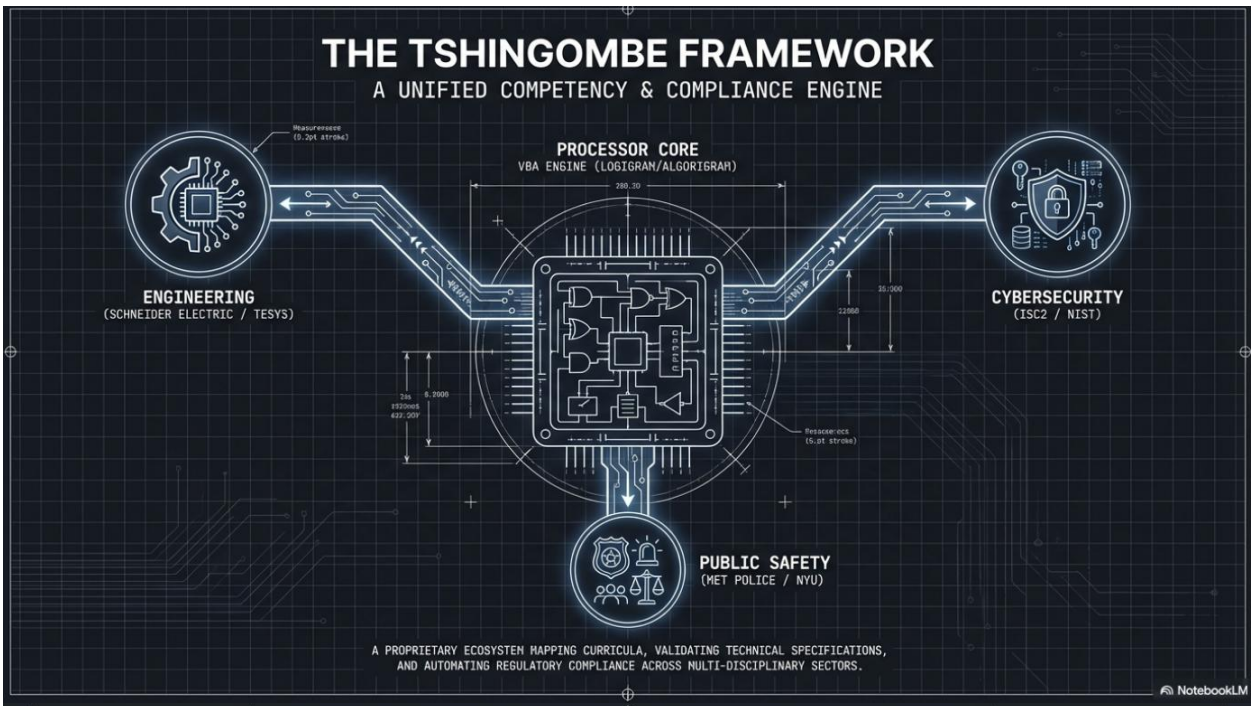
High-Impact Knowledge Sharing

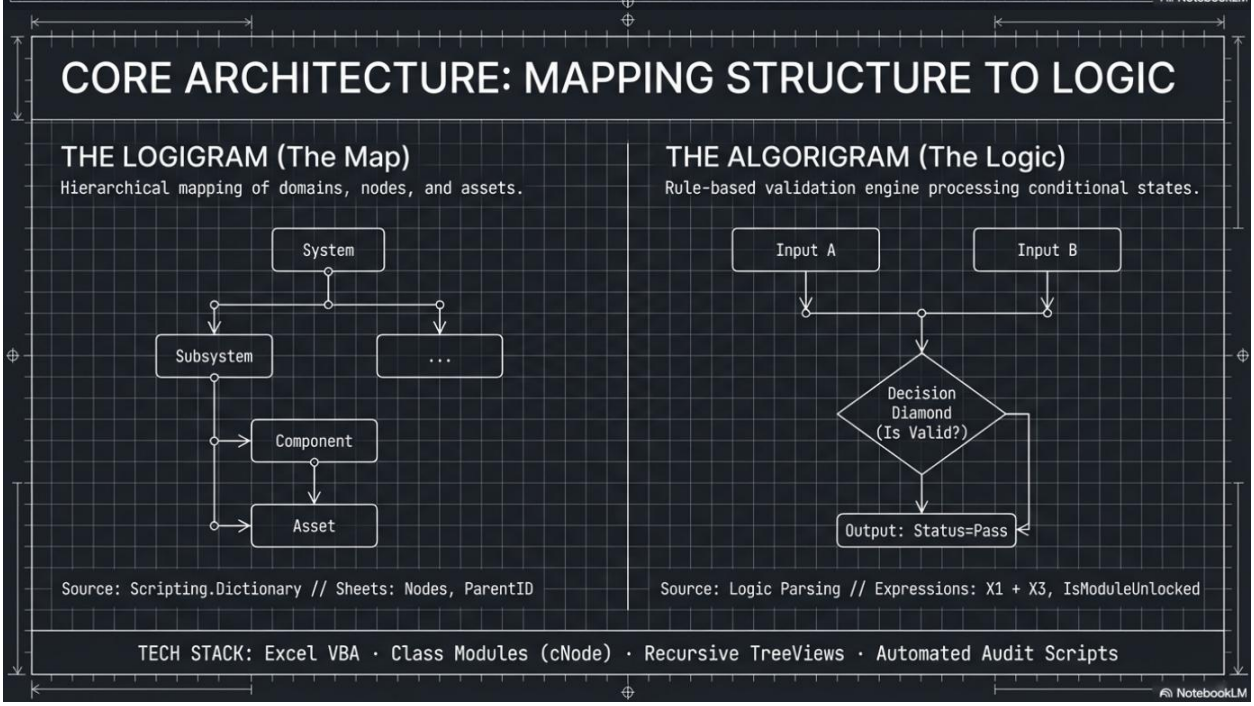
Regulatory & Legal Alignment
Aligns career outcomes with standards for international trade recognition

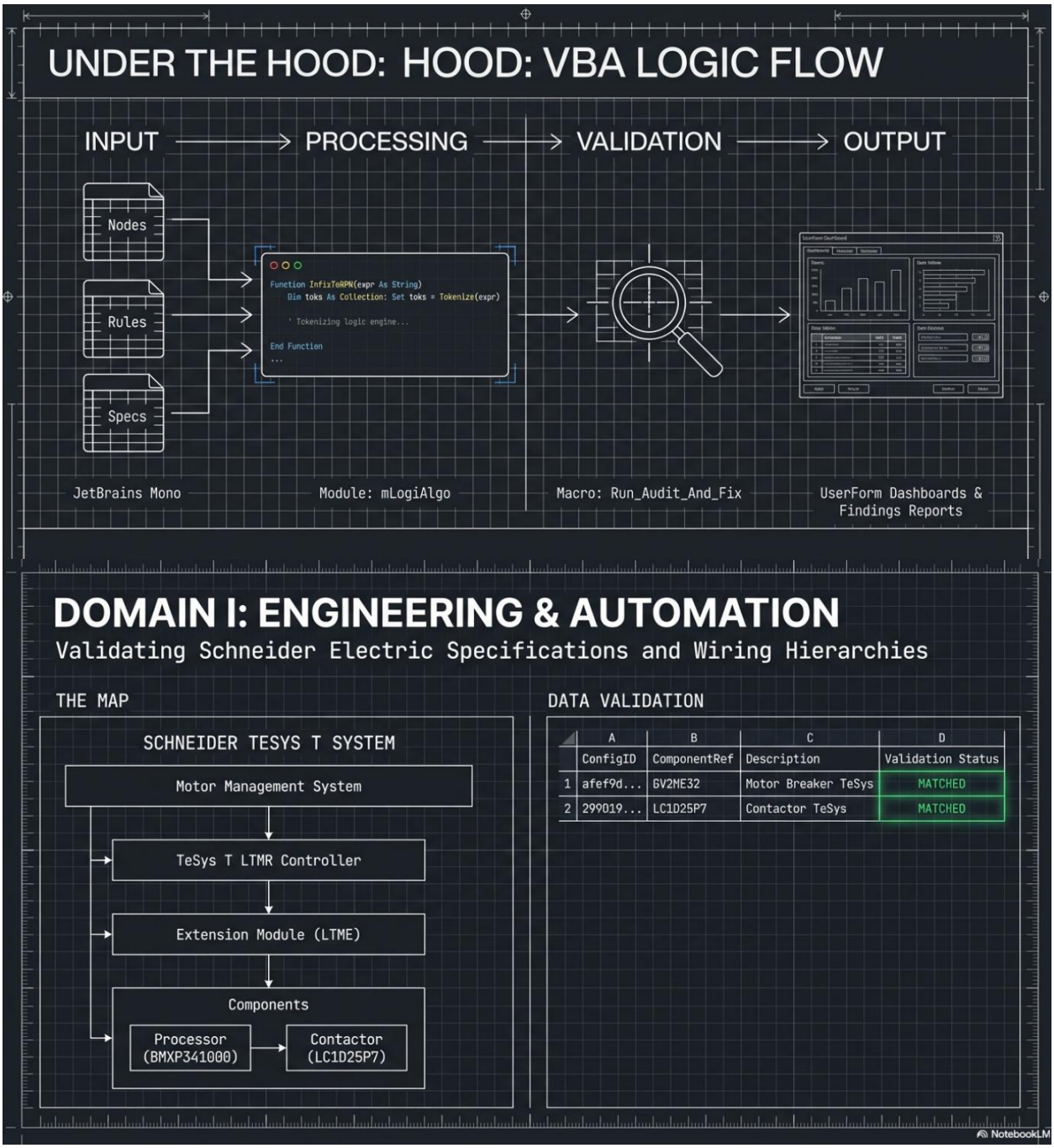
Audit-Ready Technical Record Fields

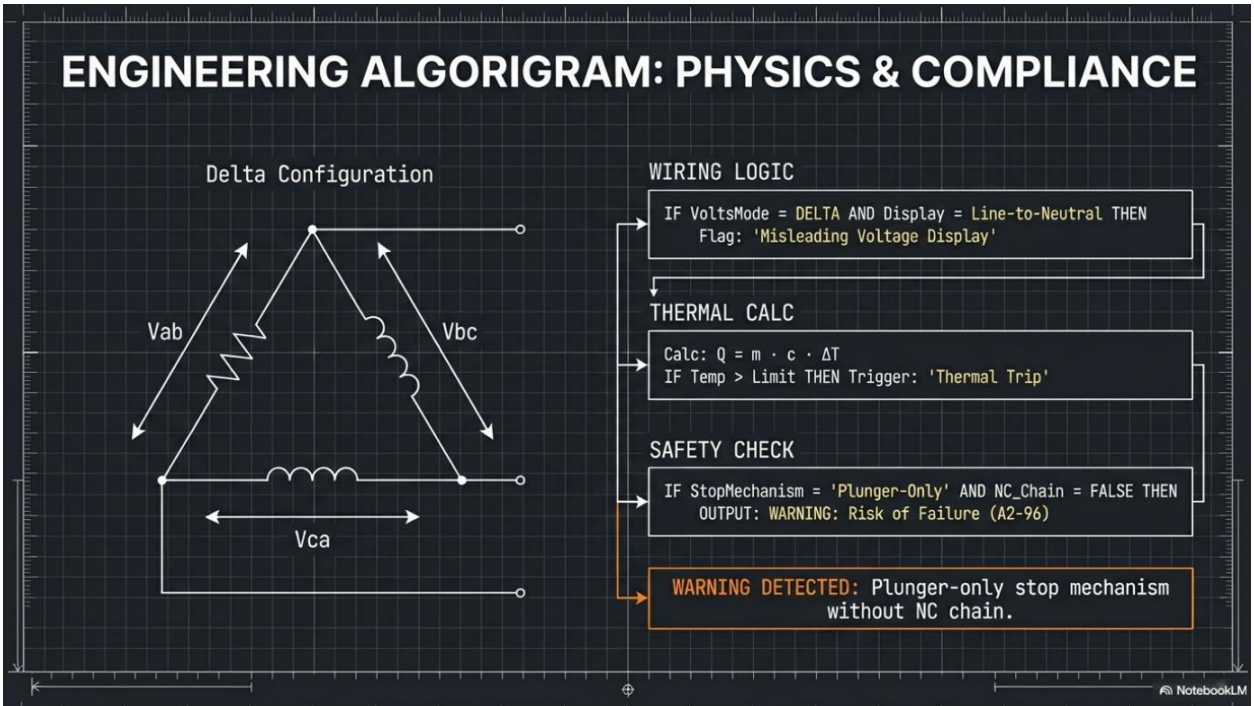
NotebookLM

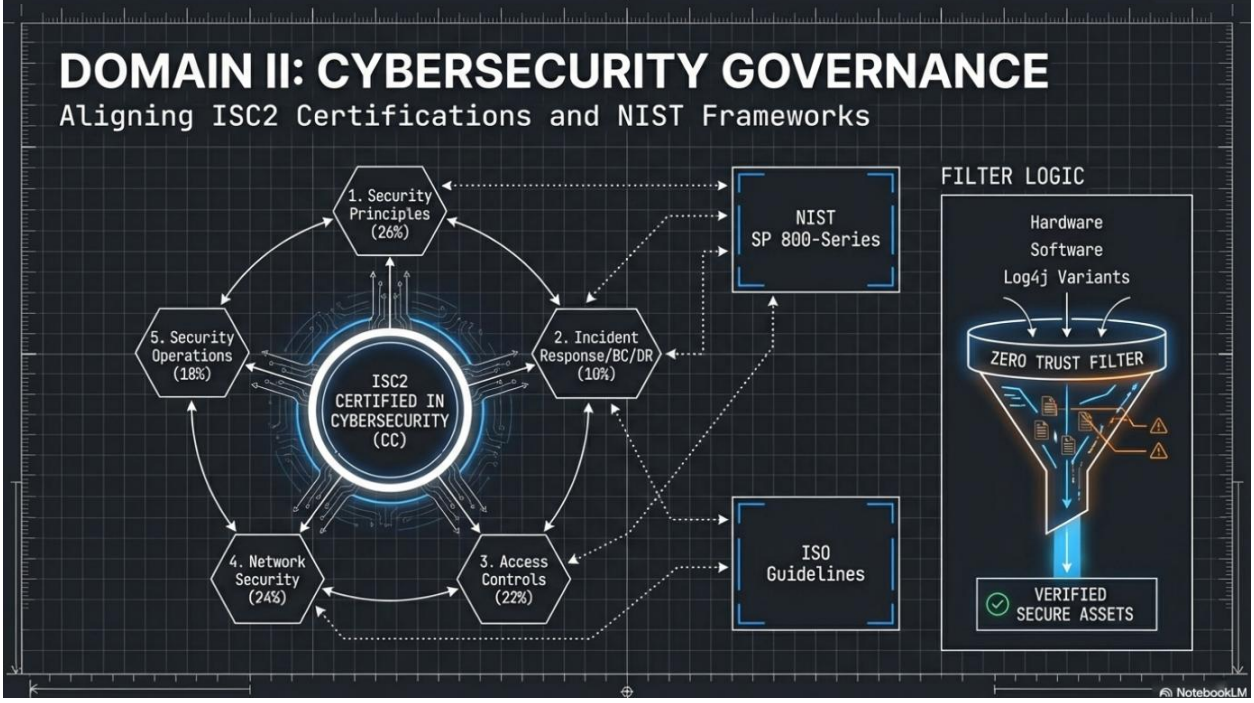

RE-ENGINEERING TECHNICAL EDUCATION: A BLUEPRINT FOR THE FUTURE
THE CHALLENGE: A FRAGMENTED SYSTEM
DISCONNECTED THEORY & PRACTICE
Economic and trade theories are often abstract and not embedded in technical curriculum.
FRAGMENTED CREDENTIALING
Credentials are inconsistent across institutions, hindering learner mobility and recognition.
POOR REGULATORY ALIGNMENT
Digital learning platforms often lack alignment with National Qualification Frameworks (NQF).
LEARNING MODULE
NO ALIGNMENT
NATIONAL QUALIFICATION FRAMEWORK (NQF)
THE SOLUTION: AN INTEGRATED CREDENTIAL ECOSYSTEM
MODULAR, STANDARDS-ALIGNED CURRICULUM
Learning is broken into modules mapped directly to national standards like SAQA/NQF.
SAQA/NQF STANDARDS
DIGITAL, PORTFOLIO-DRIVEN LEARNING
Learners use platforms like LMS and GitHub to build a verifiable digital portfolio.
LEARNER PORTFOLIO
GitHub
AI DIAGNOSTICS
SIMULATION MODEL
AI
REAL-WORLD DIAGNOSTIC INTEGRATION
The curriculum embeds hands-on engineering diagnostics, simulations, and AI tools.
NotebookLM

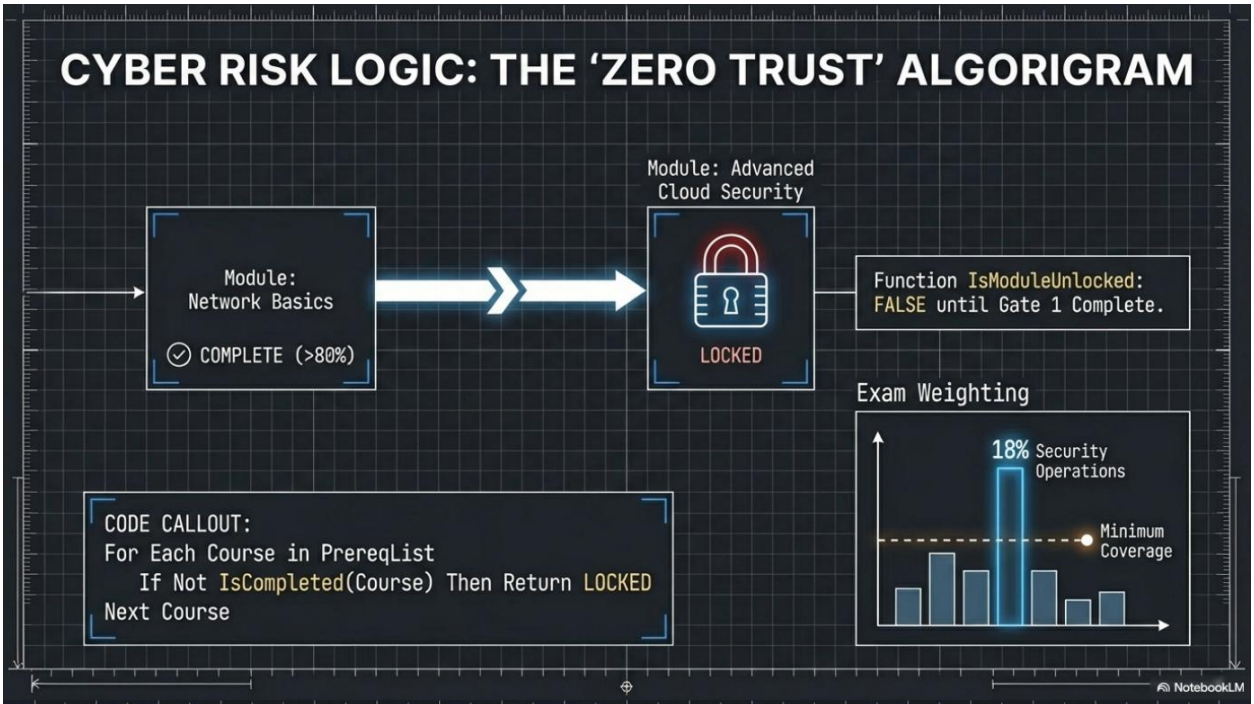

THE TSHINGOMBE FRAMEWORK
A UNIFIED COMPETENCY & COMPLIANCE ENGINE
PROCESSOR CORE
VBA ENGINE (LOGIGRAM/ALGORIGRAM)
ENGINEERING
(SCHNEIDER ELECTRIC / TESYS)
CYBERSECURITY
(ISC2 / NIST)
PUBLIC SAFETY
(MET POLICE / NYU)
A PROPRIETARY ECOSYSTEM MAPPING CURRICULA, VALIDATING TECHNICAL SPECIFICATIONS,
AND AUTOMATING REGULATORY COMPLIANCE ACROSS MULTI-DISCIPLINARY SECTORS.
NotebookLM

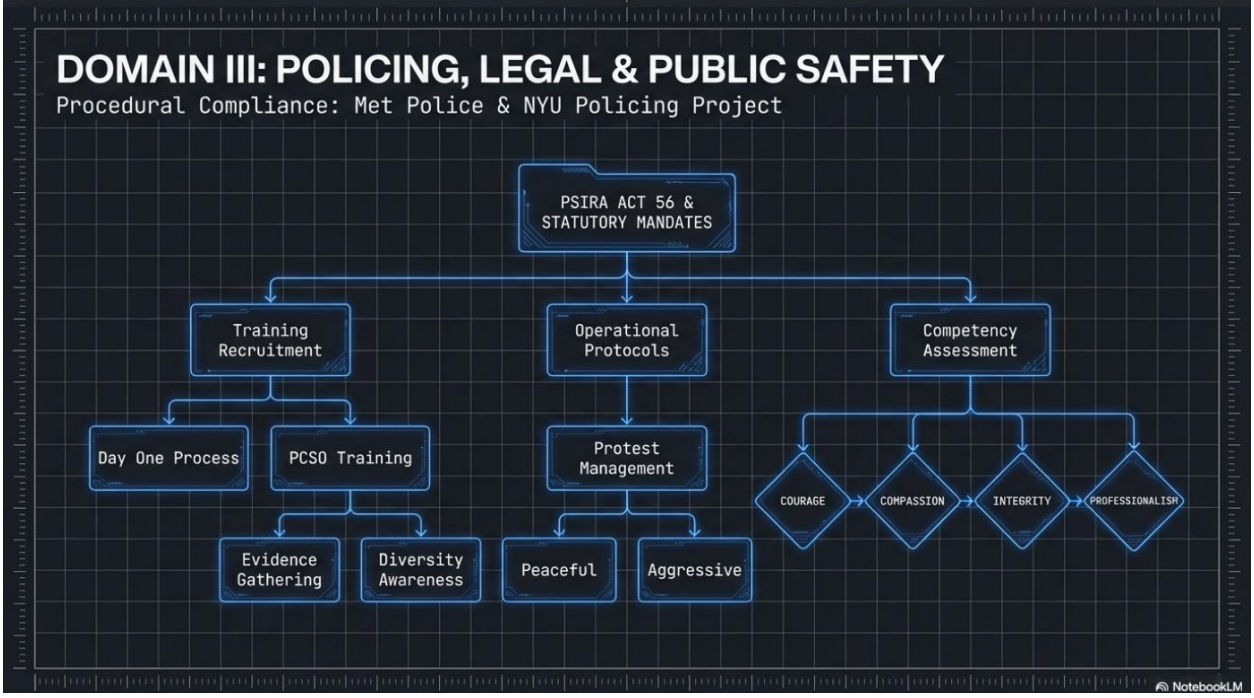

CORE ARCHITECTURE: MAPPING STRUCTURE TO LOGIC
THE LOGIGRAM (The Map)
Hierarchical mapping of domains, nodes, and assets.
System
Subsystem
...
Component
Asset
Source: Scripting.Dictionary // Sheets: Nodes, ParentID
THE ALGORIGRAM (The Logic)
Rule-based validation engine processing conditional states.
Input A
Input B
Decision Diamond (Is Valid?)
Output: Status=Pass
Source: Logic Parsing // Expressions: X1 + X3, IsModuleUnlocked
TECH STACK: Excel VBA · Class Modules (cNode) · Recursive TreeViews · Automated Audit Scripts
NotebookLM

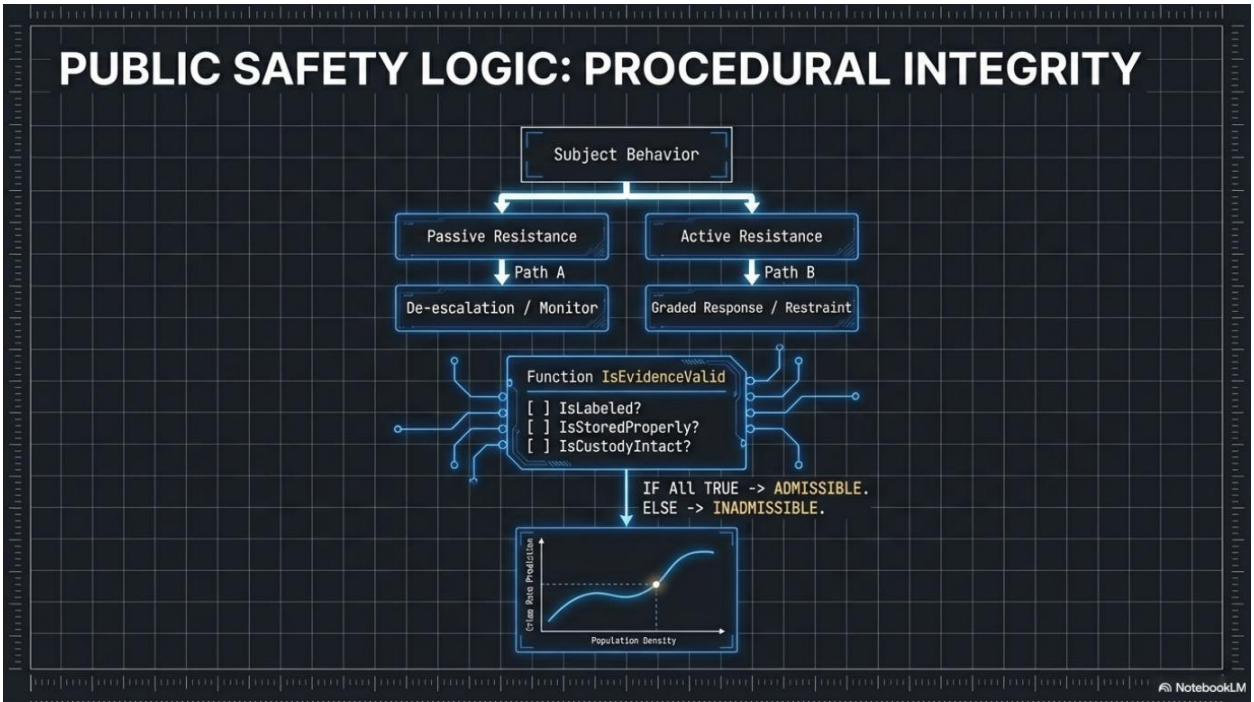

UNDER THE HOOD: HOOD: VBA LOGIC FLOW
INPUT
PROCESSING
VALIDATION
OUTPUT
Nodes
Rules
Specs
Function InfixToRPN(expr As String)
Dim toks As Collection: Set toks = Tokenize(expr)
' Tokenizing logic engine...
End Function
...
JetBrains Mono
Module: mLogiAlgo
Macro: Run_Audit_And_Fix
UserForm Dashboards & Findings Reports
DOMAIN I: ENGINEERING & AUTOMATION
Validating Schneider Electric Specifications and Wiring Hierarchies
THE MAP
SCHNEIDER TESYS T SYSTEM
Motor Management System
TeSys T LTMR Controller
Extension Module (LTME)
Components
Processor (BMXP341000)
Contactor (LC1D25P7)
DATA VALIDATION
A
B
C
D
ConfigID
ComponentRef
Description
Validation Status
1
afef9d...
GV2ME32
Motor Breaker TeSys
MATCHED
2
299019...
LC1D25P7
Contactor TeSys
MATCHED
NotebookLM

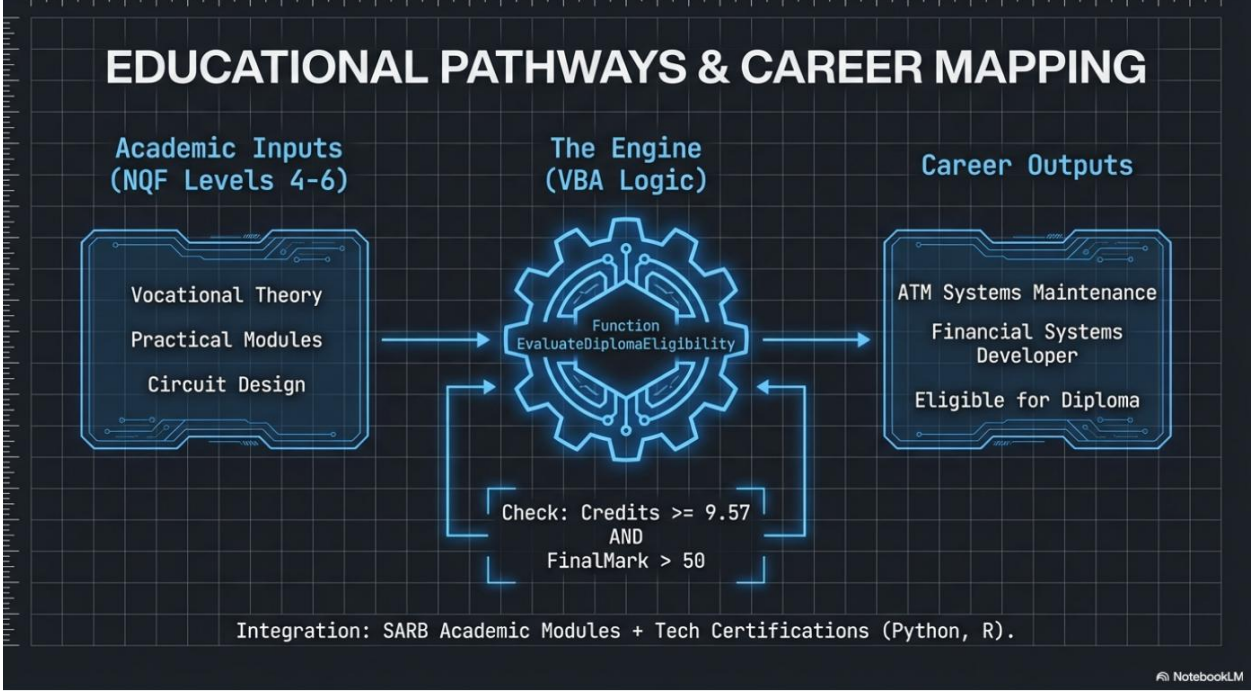

ENGINEERING ALGORIGRAM: PHYSICS & COMPLIANCE
Delta Configuration
Vab
Vbc
Vca
WIRING LOGIC
IF VoltsMode = DELTA AND Display = Line-to-Neutral THEN
Flag: 'Misleading Voltage Display'
THERMAL CALC
Calc: Q = m · c · ΔT
IF Temp > Limit THEN Trigger: 'Thermal Trip'
SAFETY CHECK
IF StopMechanism = 'Plunger-Only' AND NC_Chain = FALSE THEN
OUTPUT: WARNING: Risk of Failure (A2-96)
WARNING DETECTED: Plunger-only stop mechanism without NC chain.
NotebookLM

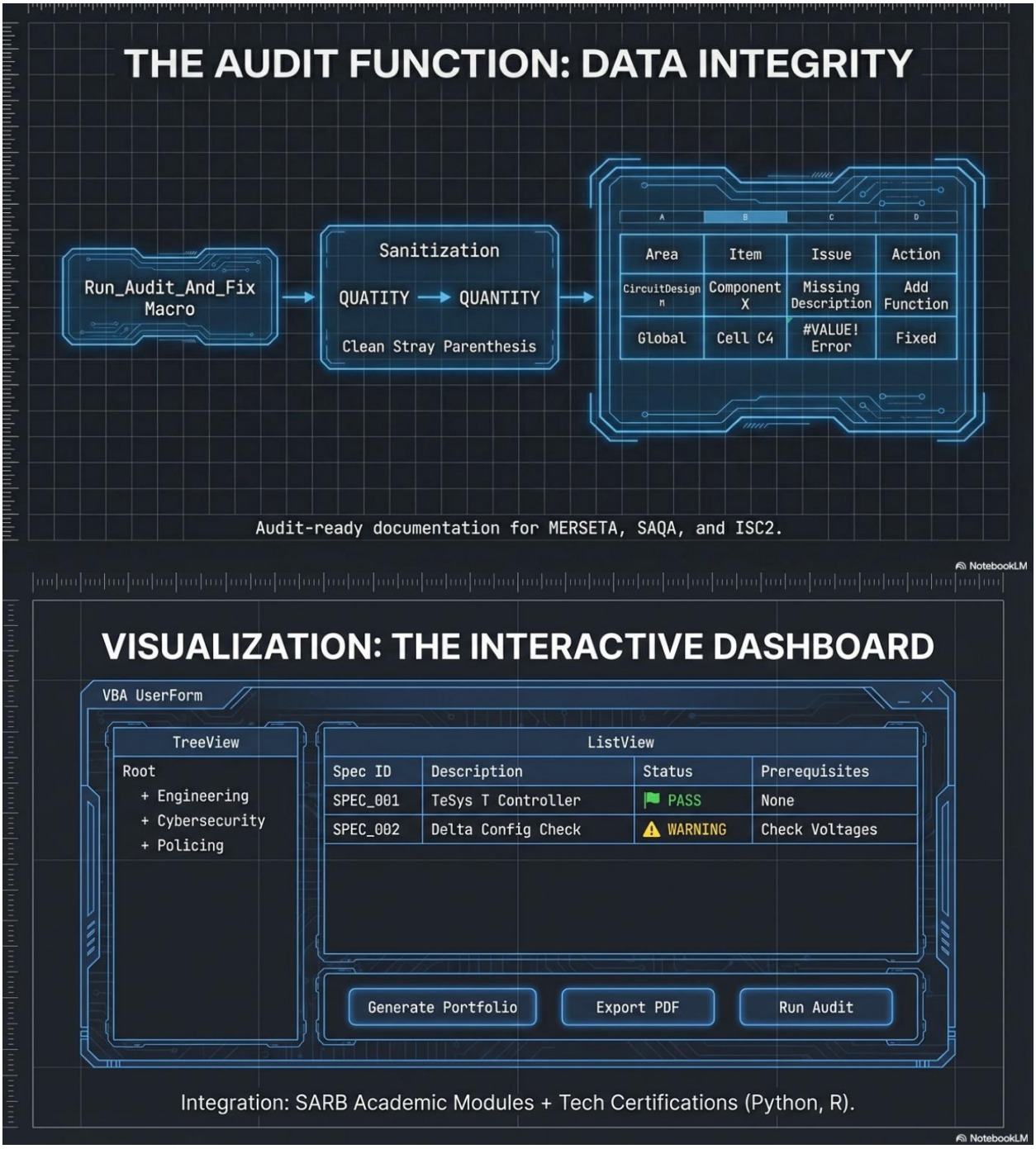

DOMAIN II: CYBERSECURITY GOVERNANCE
Aligning ISC2 Certifications and NIST Frameworks
1. Security Principles (26%)
2. Incident Response/BC/DR (10%)
3. Access Controls (22%)
4. Network Security (24%)
5. Security Operations (18%)
ISC2 CERTIFIED IN CYBERSECURITY (CC)
NIST SP 800-Series
ISO Guidelines
FILTER LOGIC
Hardware
Software
Log4j Variants
ZERO TRUST FILTER
VERIFIED SECURE ASSETS
NotebookLM

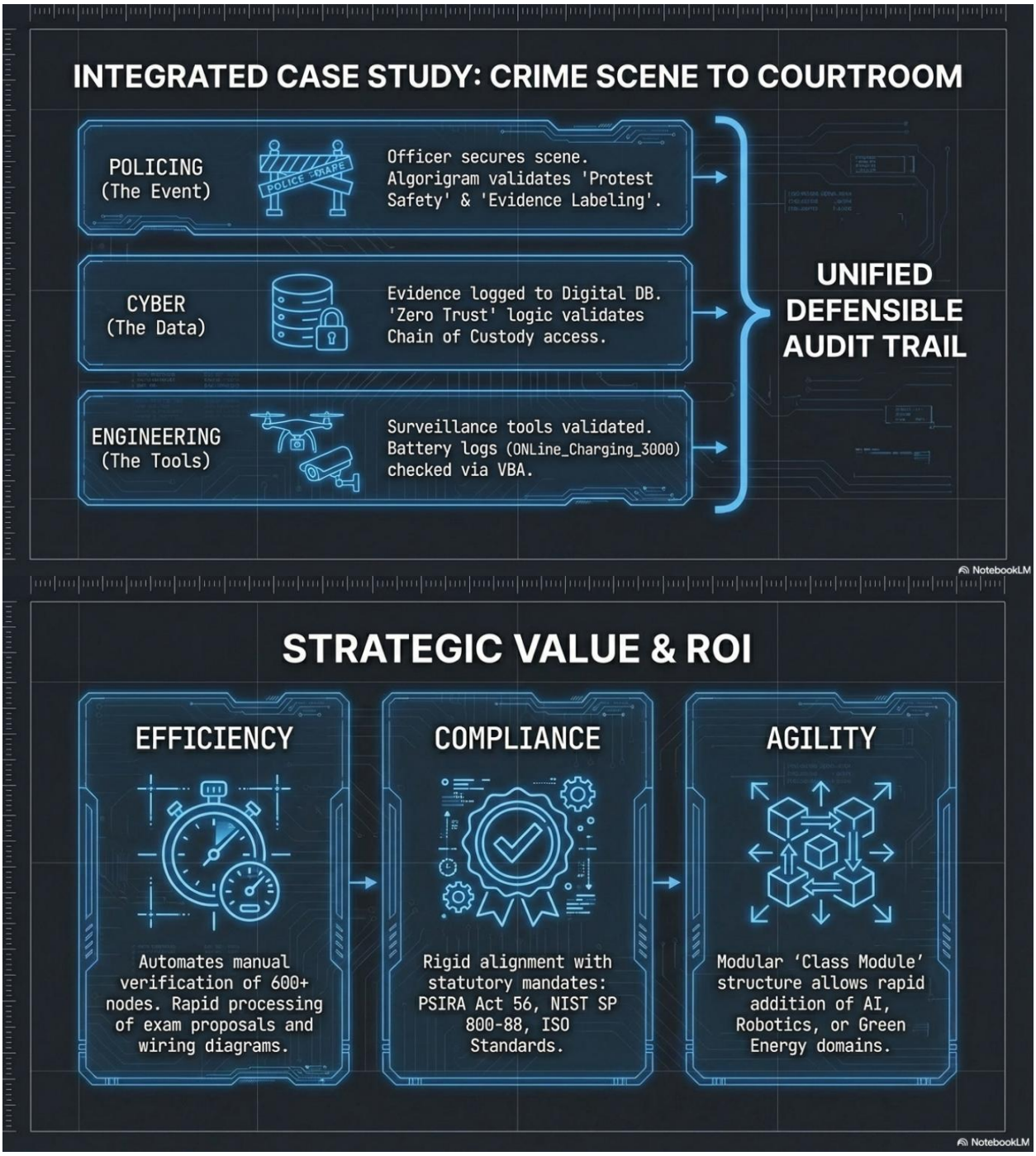

CYBER RISK LOGIC: THE 'ZERO TRUST' ALGORIGRAM
Module: Advanced Cloud Security
Module: Network Basics
COMPLETE (>80%)
LOCKED
Function IsModuleUnlocked: FALSE until Gate 1 Complete.
Exam Weighting
18% Security Operations
Minimum Coverage
CODE CALLOUT:
For Each Course in PrereqList
If Not IsCompleted(Course) Then Return LOCKED
Next Course
NotebookLM

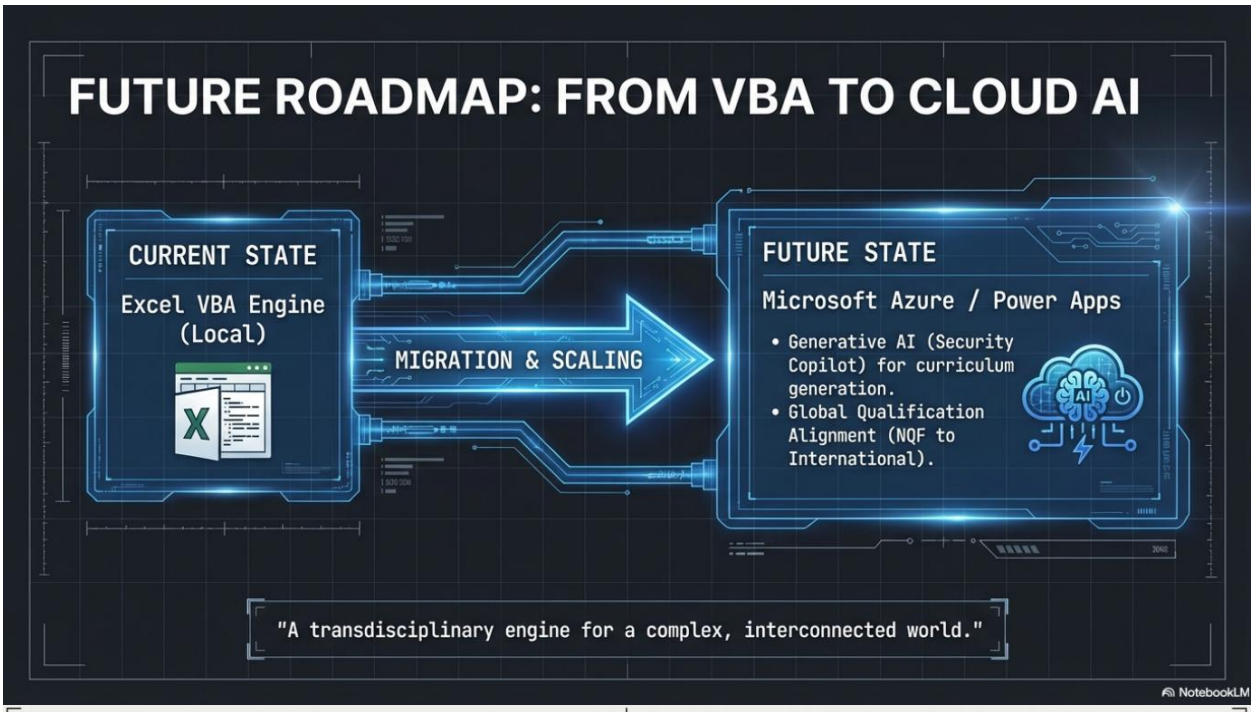

DOMAIN III: POLICING, LEGAL & PUBLIC SAFETY
Procedural Compliance: Met Police & NYU Policing Project
PSIRA ACT 56 & STATUTORY MANDATES
Training Recruitment
Operational Protocols
Competency Assessment
Day One Process
PCSO Training
Protest Management
COURAGE
COMPASSION
INTEGRITY
PROFESSIONALISM
Evidence Gathering
Diversity Awareness
Peaceful
Aggressive
NotebookLM

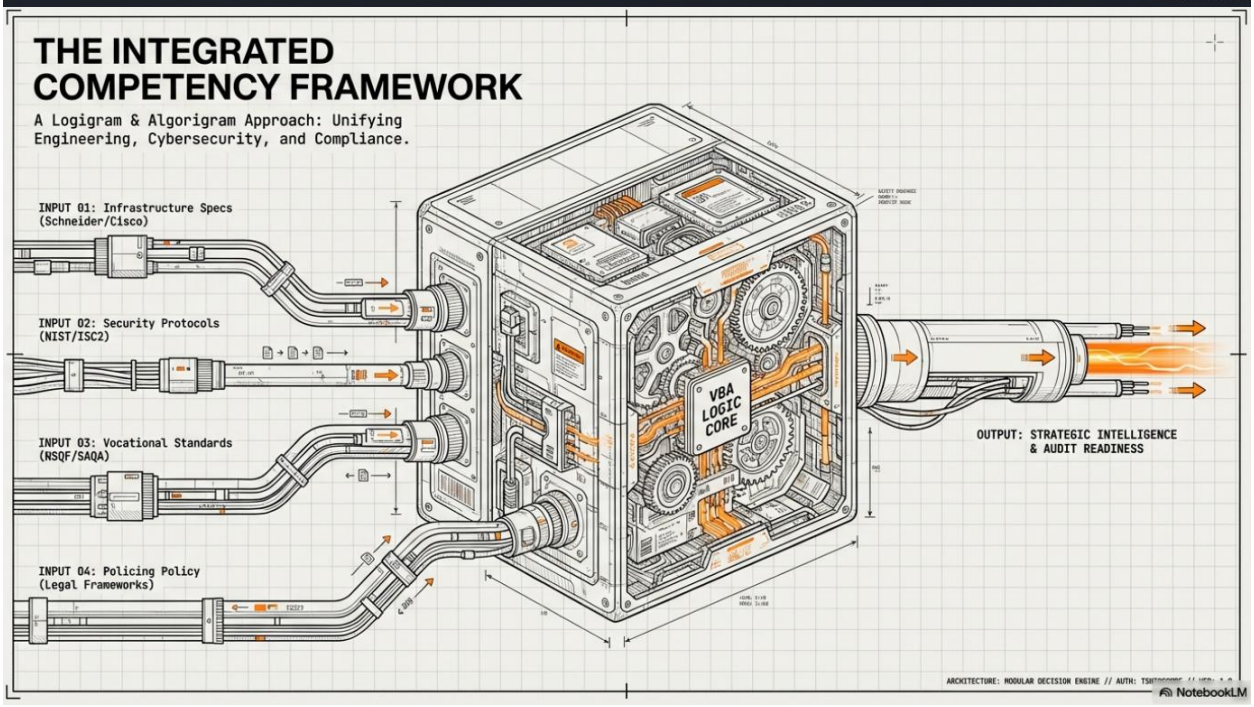

PUBLIC SAFETY LOGIC: PROCEDURAL INTEGRITY
Subject Behavior
Passive Resistance
Active Resistance
Path A
Path B
De-escalation / Monitor
Graded Response / Restraint
Function IsEvidenceValid
[ ] IsLabeled?
[ ] IsStoredProperly?
[ ] IsCustodyIntact?
IF All TRUE -> ADMISSIBLE.
ELSE -> INADMISSIBLE.
Crime Rate Prediction
Population Density
NotebookLM

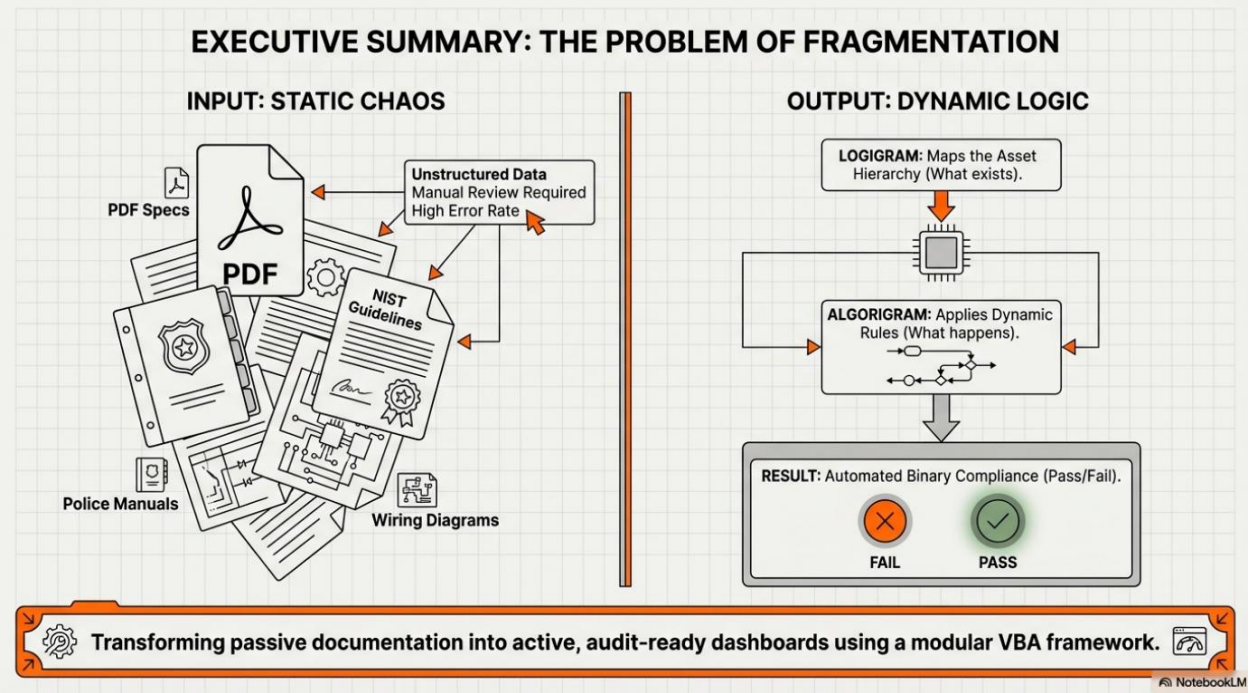

EDUCATIONAL PATHWAYS & CAREER MAPPING
Academic Inputs
(NQF Levels 4-6)
The Engine
(VBA Logic)
Career Outputs
Vocational Theory
Practical Modules
Circuit Design
Function
EvaluateDiplomaEligibility
ATM Systems Maintenance
Financial Systems
Developer
Eligible for Diploma
Check: Credits >= 9.57
AND
FinalMark > 50
Integration: SARB Academic Modules + Tech Certifications (Python, R).
NotebookLM

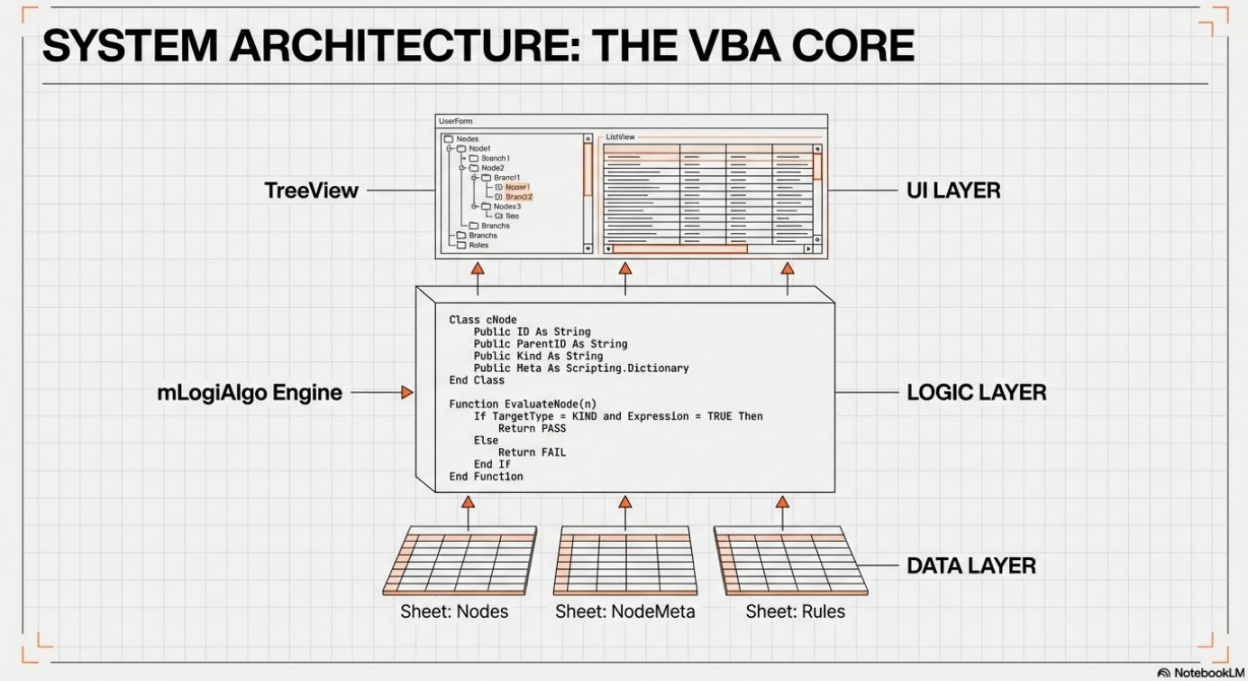

THE AUDIT FUNCTION: DATA INTEGRITY
Run_Audit_And_Fix Macro
Sanitization
QUATITY → QUANTITY
Clean Stray Parenthesis
A
B
C
D
Area
Item
Issue
Action
CircuitDesign
Component X
Missing Description
Add Function
Global
Cell C4
#VALUE! Error
Fixed
Audit-ready documentation for MERSETA, SAQA, and ISC2.
NotebookLM
VISUALIZATION: THE INTERACTIVE DASHBOARD
VBA UserForm
TreeView
Root
+ Engineering
+ Cybersecurity
+ Policing
ListView
Spec ID
Description
Status
Prerequisites
SPEC_001
TeSys T Controller
PASS
None
SPEC_002
Delta Config Check
WARNING
Check Voltages
Generate Portfolio
Export PDF
Run Audit
Integration: SARB Academic Modules + Tech Certifications (Python, R).
NotebookLM


INTEGRATED CASE STUDY: CRIME SCENE TO COURTROOM
POLICING
(The Event)
POLICE LINE DO NOT CROSS
Officer secures scene. Algorigram validates 'Protest Safety' & 'Evidence Labeling'.
CYBER
(The Data)
Evidence logged to Digital DB. 'Zero Trust' logic validates Chain of Custody access.
ENGINEERING
(The Tools)
Surveillance tools validated. Battery logs (ONLine_Charging_3000) checked via VBA.
UNIFIED DEFENSIBLE AUDIT TRAIL
NotebookLM
STRATEGIC VALUE & ROI
EFFICIENCY
Automates manual verification of 600+ nodes. Rapid processing of exam proposals and wiring diagrams.
COMPLIANCE
Rigid alignment with statutory mandates: PSIRA Act 56, NIST SP 800-88, ISO Standards.
AGILITY
Modular 'Class Module' structure allows rapid addition of AI, Robotics, or Green Energy domains.
NotebookLM


FUTURE ROADMAP: FROM VBA TO CLOUD AI
CURRENT STATE
Excel VBA Engine (Local)
MIGRATION & SCALING
FUTURE STATE
Microsoft Azure / Power Apps
• Generative AI (Security Copilot) for curriculum generation.
• Global Qualification Alignment (NQF to International).
"A transdisciplinary engine for a complex, interconnected world."
NotebookLM

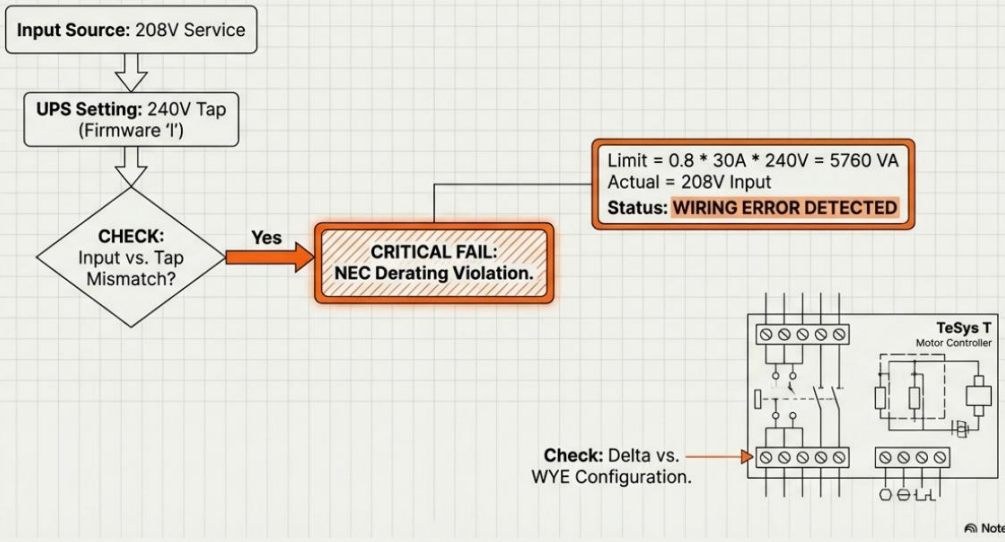

THE INTEGRATED COMPETENCY FRAMEWORK
A Logigram & Algorigram Approach: Unifying Engineering, Cybersecurity, and Compliance.
INPUT 01: Infrastructure Specs (Schneider/Cisco)
INPUT 02: Security Protocols (NIST/ISC2)
INPUT 03: Vocational Standards (RSQF/SAQA)
INPUT 04: Policing Policy (Legal Frameworks)
VBA LOGIC CORE
OUTPUT: STRATEGIC INTELLIGENCE & AUDIT READINESS
NotebookLM


EXECUTIVE SUMMARY: THE PROBLEM OF FRAGMENTATION
INPUT: STATIC CHAOS
OUTPUT: DYNAMIC LOGIC
PDF Specs
PDF
Unstructured Data
Manual Review Required
High Error Rate
NIST Guidelines
Police Manuals
Wiring Diagrams
LOGIGRAM: Maps the Asset Hierarchy (What exists).
ALGORIGRAM: Applies Dynamic Rules (What happens).
RESULT: Automated Binary Compliance (Pass/Fail).
FAIL
PASS
Transforming passive documentation into active, audit-ready dashboards using a modular VBA framework.
NotebookLM


SYSTEM ARCHITECTURE: THE VBA CORE
TreeView
UI LAYER
mLogiAlgo Engine
LOGIC LAYER
DATA LAYER
Class cNode
Public ID As String
Public ParentID As String
Public Kind As String
Public Meta As Scripting.Dictionary
End Class
Function EvaluateNode(n)
If TargetType = KIND and Expression = TRUE Then
Return PASS
Else
Return FAIL
End If
End Function
Sheet: Nodes
Sheet: NodeMeta
Sheet: Rules
NotebookLM

MODULE A: POWER SYSTEMS VALIDATION

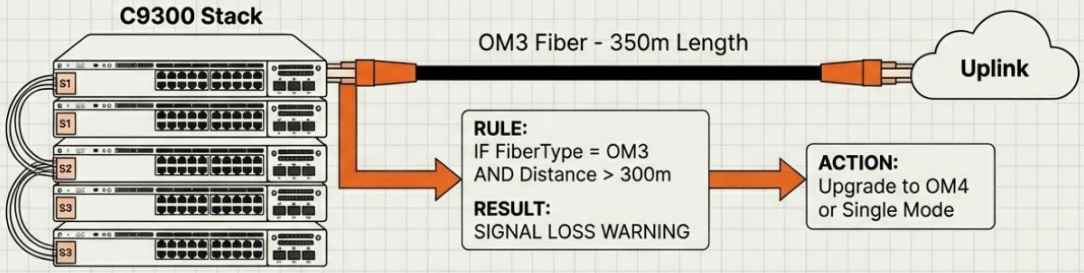
Source: Schneider Electric UPS Specs & TeSys Motor Management


Input Source: 208V Service
UPS Setting: 240V Tap (Firmware 'I')
CHECK: Input vs. Tap Mismatch?
Yes
CRITICAL FAIL: NEC Derating Violation.
Limit = 0.8 * 30A * 240V = 5760 VA
Actual = 208V Input
Status: WIRING ERROR DETECTED
TeSys T
Motor Controller
Check: Delta vs. WYE Configuration.

NotebookLM

MODULE B: NETWORK ARCHITECTURE LOGIC

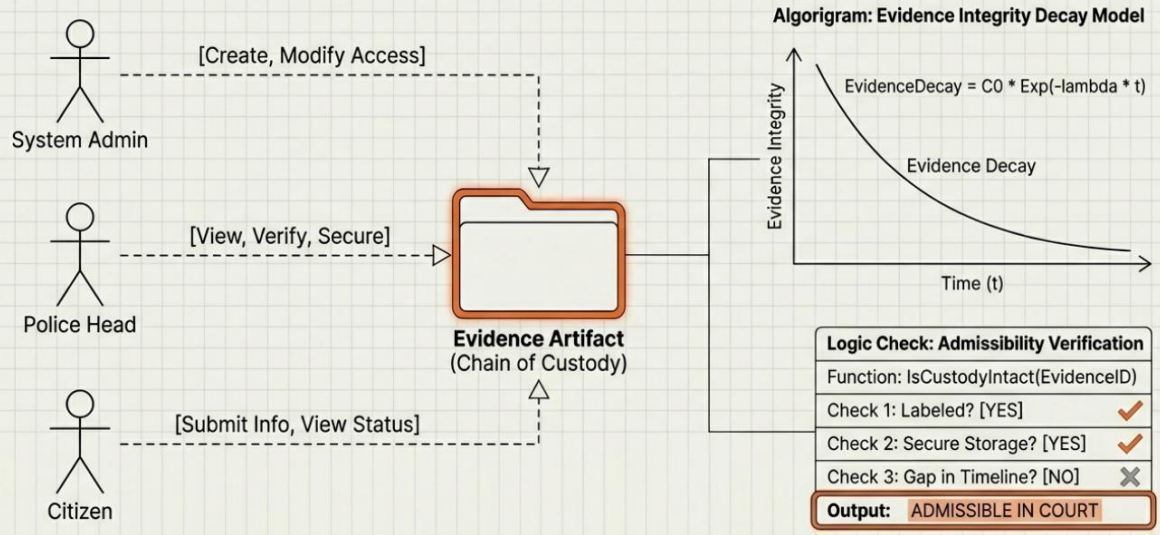
Automated Bandwidth & Fiber Compatibility Checks



Oversubscription Calculation	
Ports:	48 x 1Gbps
Uplink:	10Gbps
Ratio:	4.8:1
Threshold:	4:1
Status:	[WARNING] Saturation Risk

NotebookLM

MODULE C: SECURITY OPS & CRIME LOGIC



NotebookLM

AUTOMATED COMPLIANCE AUDITING

Compliance Matrix

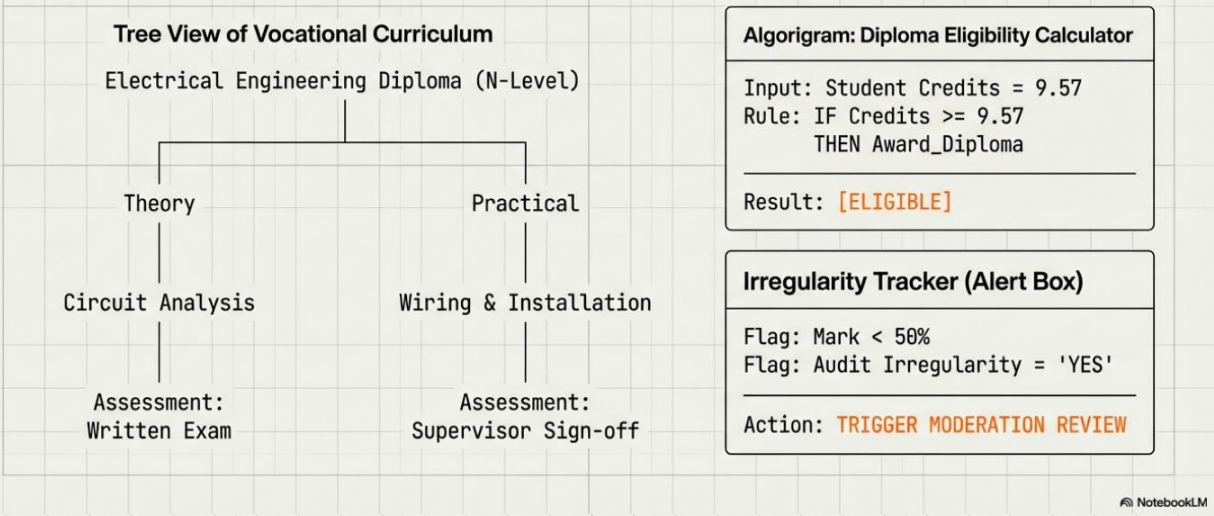
Training Module	ISC2 Domain	NIST Reference	Status
Data Security	Security Ops	NIST SP 800-88	[COMPLIANT]
Network Threats	Network Security	NIST SP 800-137	[COMPLIANT]
Access Control	Identity Mgmt	NIST SP 800-63	[PENDING]

CPE Credit Progress

```
IF Score > 700 AND Module = "System Hardening" THEN Compliance = TRUE
```

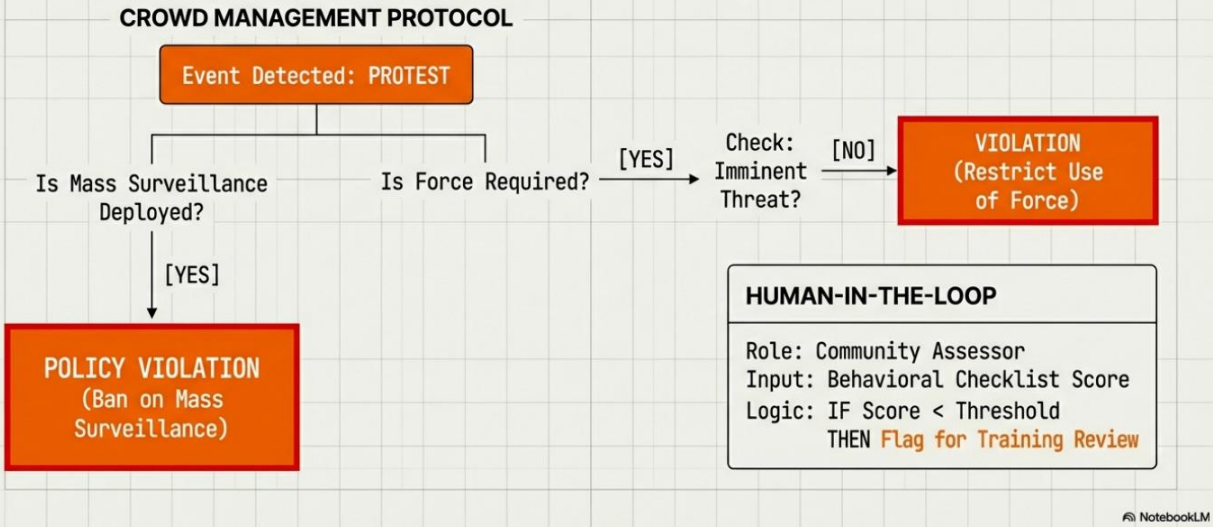
NotebookLM

MODULE D: EDUCATIONAL GOVERNANCE ENGINE

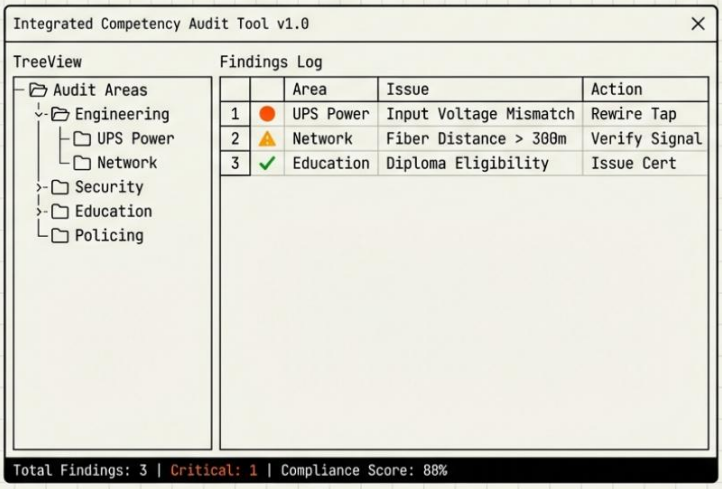


MODULE E: POLICING POLICY & RISK LOGIC

Digitizing 'Use of Force' and Protest Policy



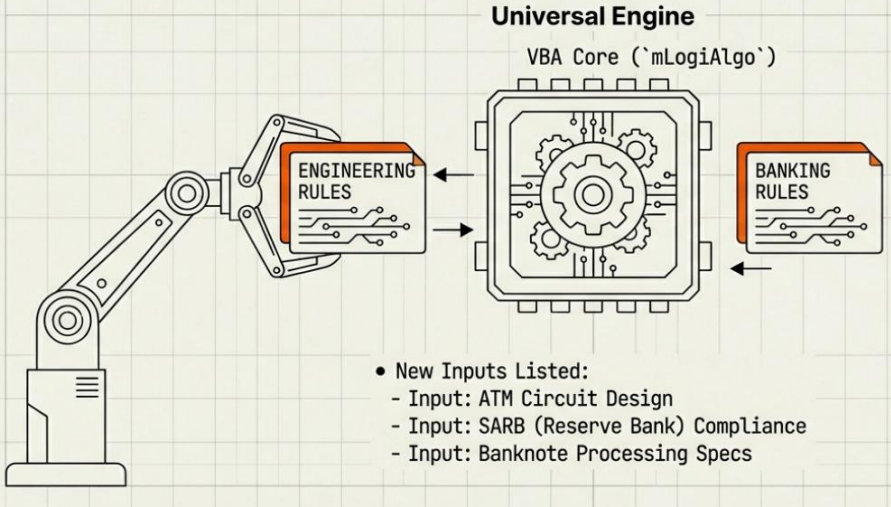
THE DASHBOARD: AUTOMATED AUDIT OUTPUTS



NotebookLM

CROSS-SECTOR ADAPTABILITY: FINTECH

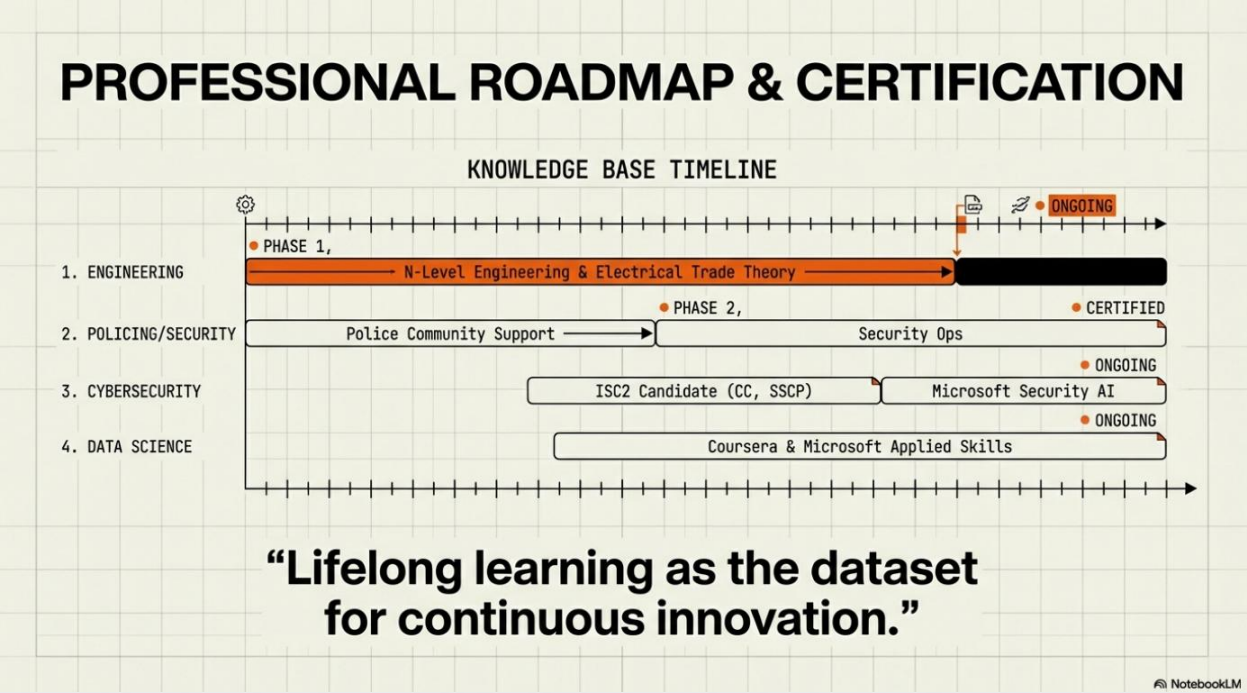
Digitizing Financial Compliance & Banking Operations



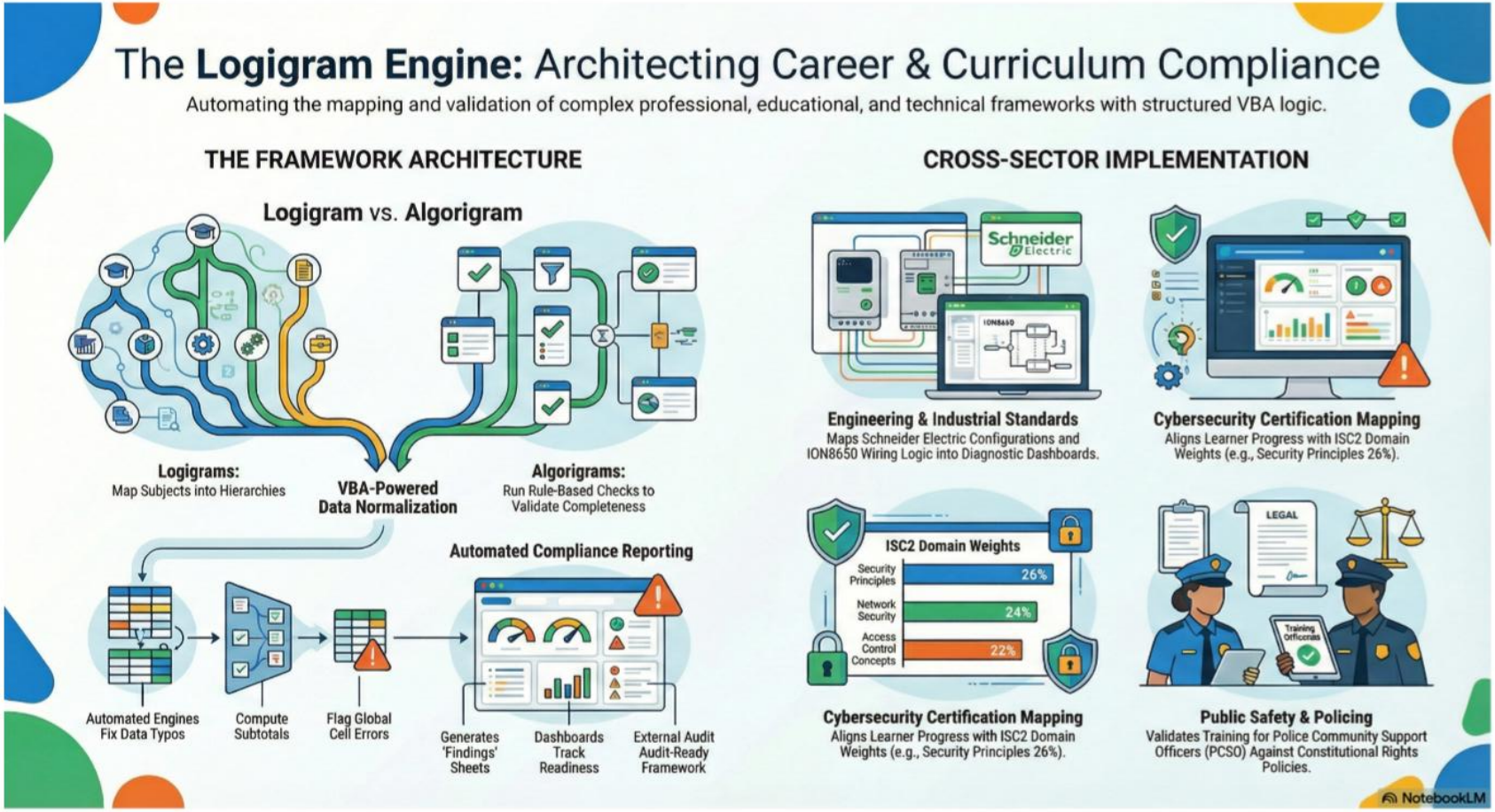
The VBA Core (`mLogiAlgo`) remains remains unchanged. Only the data sheets (`Nodes`, `Rules`) are swapped to pivot from Engineering to Finance.

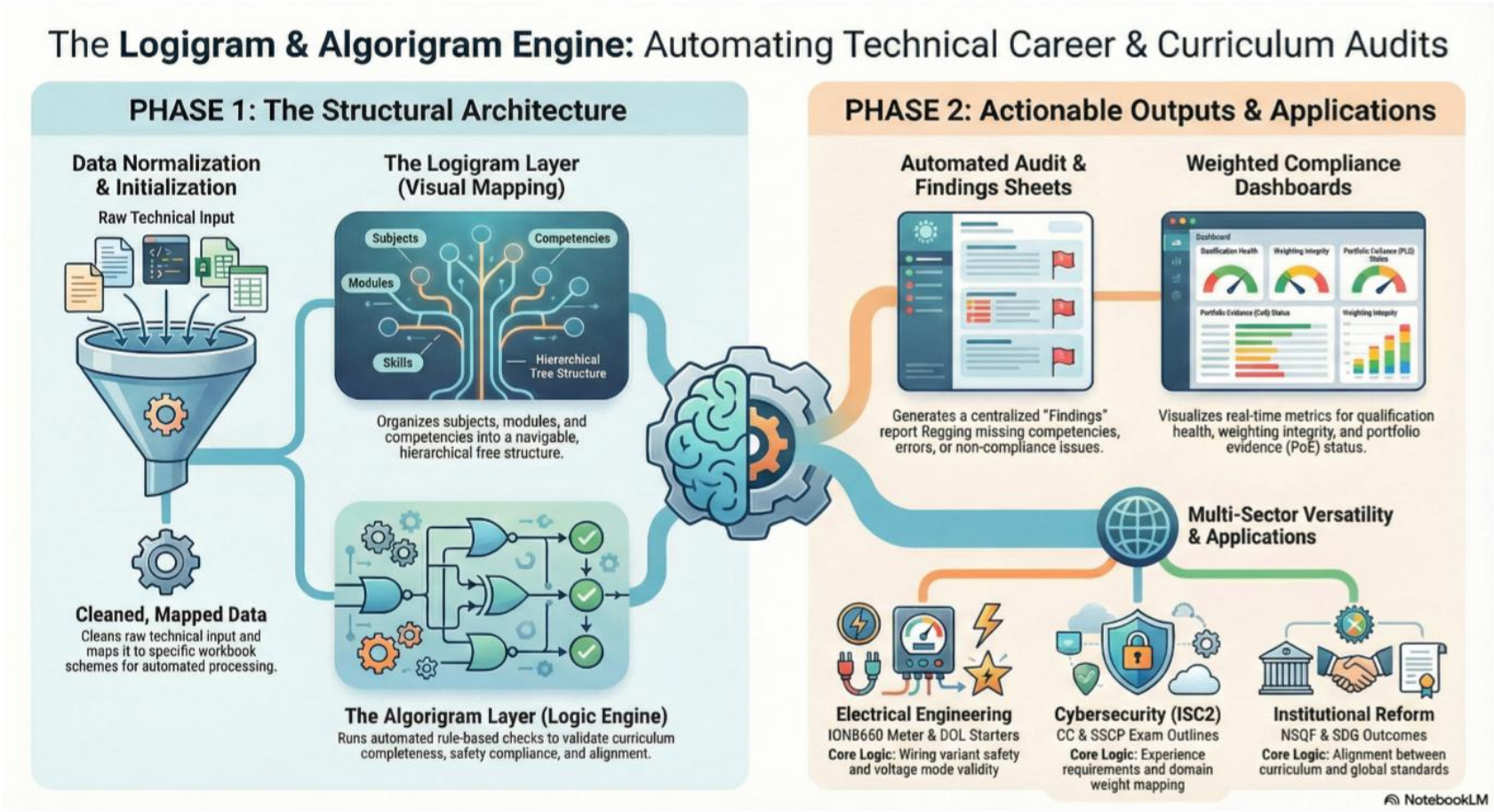
- New Inputs Listed:
  - Input: ATM Circuit Design
  - Input: SARB (Reserve Bank) Compliance
  - Input: Banknote Processing Specs

NotebookLM


PROFESSIONAL ROADMAP & CERTIFICATION
KNOWLEDGE BASE TIMELINE
ONGOING
PHASE 1,
1. ENGINEERING
N-Level Engineering & Electrical Trade Theory
PHASE 2,
CERTIFIED
2. POLICING/SECURITY
Police Community Support
Security Ops
ONGOING
3. CYBERSECURITY
ISC2 Candidate (CC, SSCP)
Microsoft Security AI
ONGOING
4. DATA SCIENCE
Coursera & Microsoft Applied Skills
"Lifelong learning as the dataset for continuous innovation."
NotebookLM

OPERATIONAL READINESS
✓ Hardware Specification Auditing (Engineering)
✓ Risk & Compliance Validation (Cyber/Policing)
✓ Curriculum & Career Management (Education)
THE LOGIGRAM ENGINE
READY FOR DEPLOYMENT.
Target Environments: SOCs, Engineering Design Firms, Educational Institutions
Author: Tshingombe | Portfolio: Integrated Competency Framework
NotebookLM


The Logigram Engine: Architecting Career & Curriculum Compliance
Automating the mapping and validation of complex professional, educational, and technical frameworks with structured VBA logic.
THE FRAMEWORK ARCHITECTURE
Logigram vs. Algorigram
Logigrams:
Map Subjects into Hierarchies
VBA-Powered Data Normalization
Algorigrams:
Run Rule-Based Checks to Validate Completeness
Automated Compliance Reporting
Automated Engines Fix Data Typos
Compute Subtotals
Flag Global Cell Errors
Generates 'Findings' Sheets
Dashboards Track Readiness
External Audit Audit-Ready Framework
CROSS-SECTOR IMPLEMENTATION
Schneider Electric
ION8650
Engineering & Industrial Standards
Maps Schneider Electric Configurations and ION8650 Wiring Logic into Diagnostic Dashboards.
Cybersecurity Certification Mapping
Aligns Learner Progress with ISC2 Domain Weights (e.g., Security Principles 26%).
ISC2 Domain Weights
Security Principles
26%
Network Security
24%
Access Control Concepts
22%
Cybersecurity Certification Mapping
Aligns Learner Progress with ISC2 Domain Weights (e.g., Security Principles 26%).
LEGAL
Training Officerias
Public Safety & Policing
Validates Training for Police Community Support Officers (PCSO) Against Constitutional Rights Policies.
NotebookLM


The Logigram & Algorigram Engine: Automating Technical Career & Curriculum Audits
PHASE 1: The Structural Architecture
Data Normalization & Initialization
Raw Technical Input
Cleaned, Mapped Data
Cleans raw technical input and maps it to specific workbook schemes for automated processing.
The Logigram Layer (Visual Mapping)
Subjects
Competencies
Modules
Skills
Hierarchical Tree Structure
Organizes subjects, modules, and competencies into a navigable, hierarchical free structure.
The Algorigram Layer (Logic Engine)
Runs automated rule-based checks to validate curriculum completeness, safety compliance, and alignment.
PHASE 2: Actionable Outputs & Applications
Automated Audit & Findings Sheets
Generates a centralized "Findings" report Regging missing competencies, errors, or non-compliance issues.
Weighted Compliance Dashboards
Visualizes real-time metrics for qualification health, weighting integrity, and portfolio evidence (PoE) status.
Multi-Sector Versatility & Applications
Electrical Engineering
IONB660 Meter & DOL Starters
Core Logic: Wiring variant safety and voltage mode validity
Cybersecurity (ISC2)
CC & SSCP Exam Outlines
Core Logic: Experience requirements and domain weight mapping
Institutional Reform
NSQF & SDG Outcomes
Core Logic: Alignment between curriculum and global standards
NotebookLM

Master Practical AI: The DL AI-2.0 Didactic Laboratory

A comprehensive hardware and software platform for students and engineers, using challenge-based learning to bridge theory and practice in AI for Industry 4.0 applications.

A COMPLETE AI LEARNING PLATFORM

Bridge the Gap Between Theory and Practice

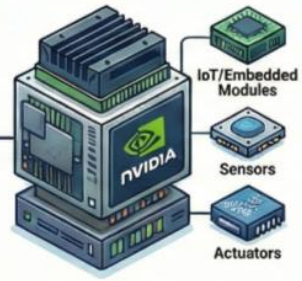
Train Up to 20 Students Simultaneously

3 students work on hardware, while 17 more connect to the server.

Designed for a Range of Disciplines

Ideal for AI, Automation, Software, Mechatronics, and IT engineering programs.

INTEGRATED HARDWARE & SOFTWARE ECOSYSTEM



Powerful Hardware Modules

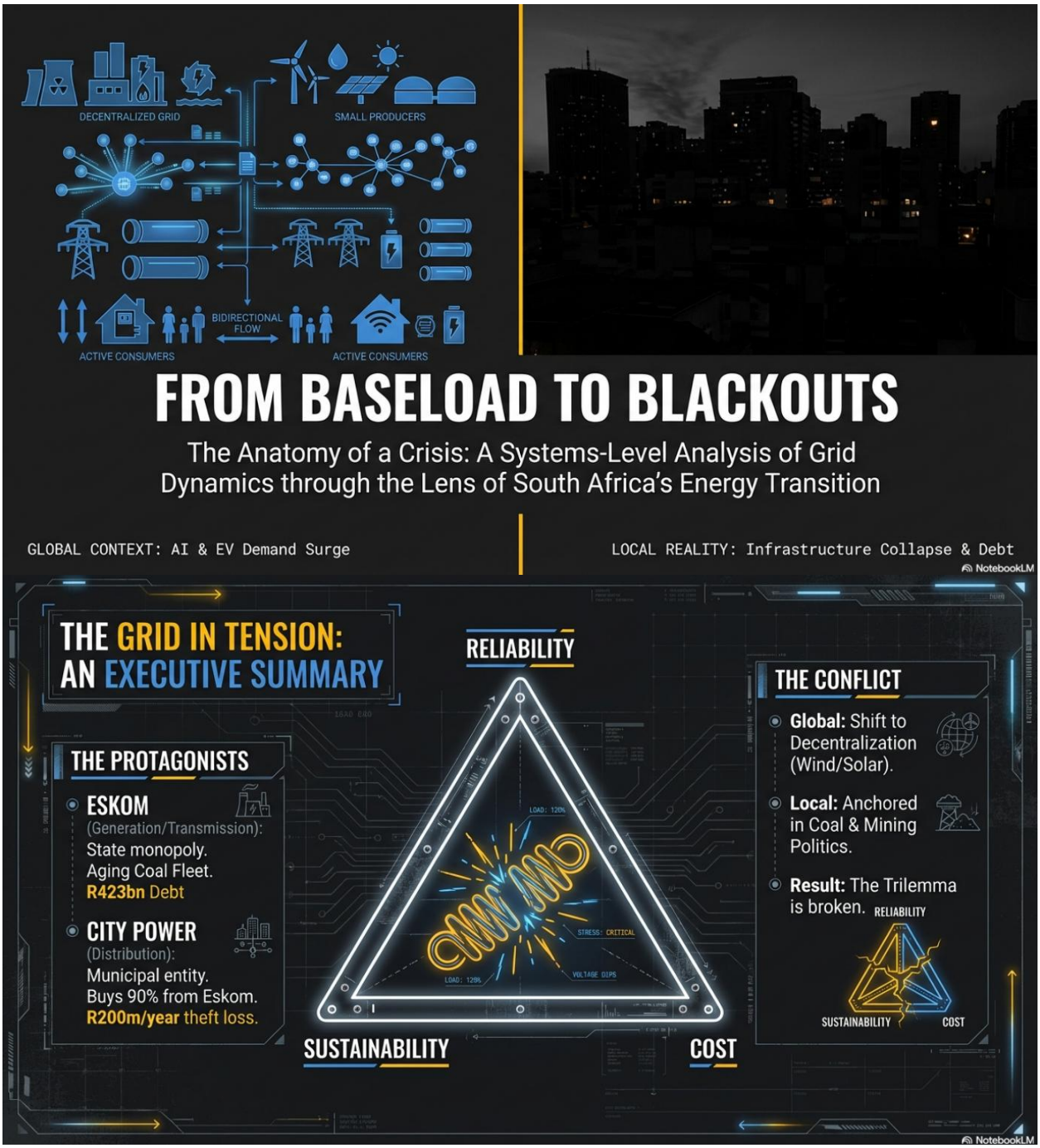
Industry-Standard Software Tools

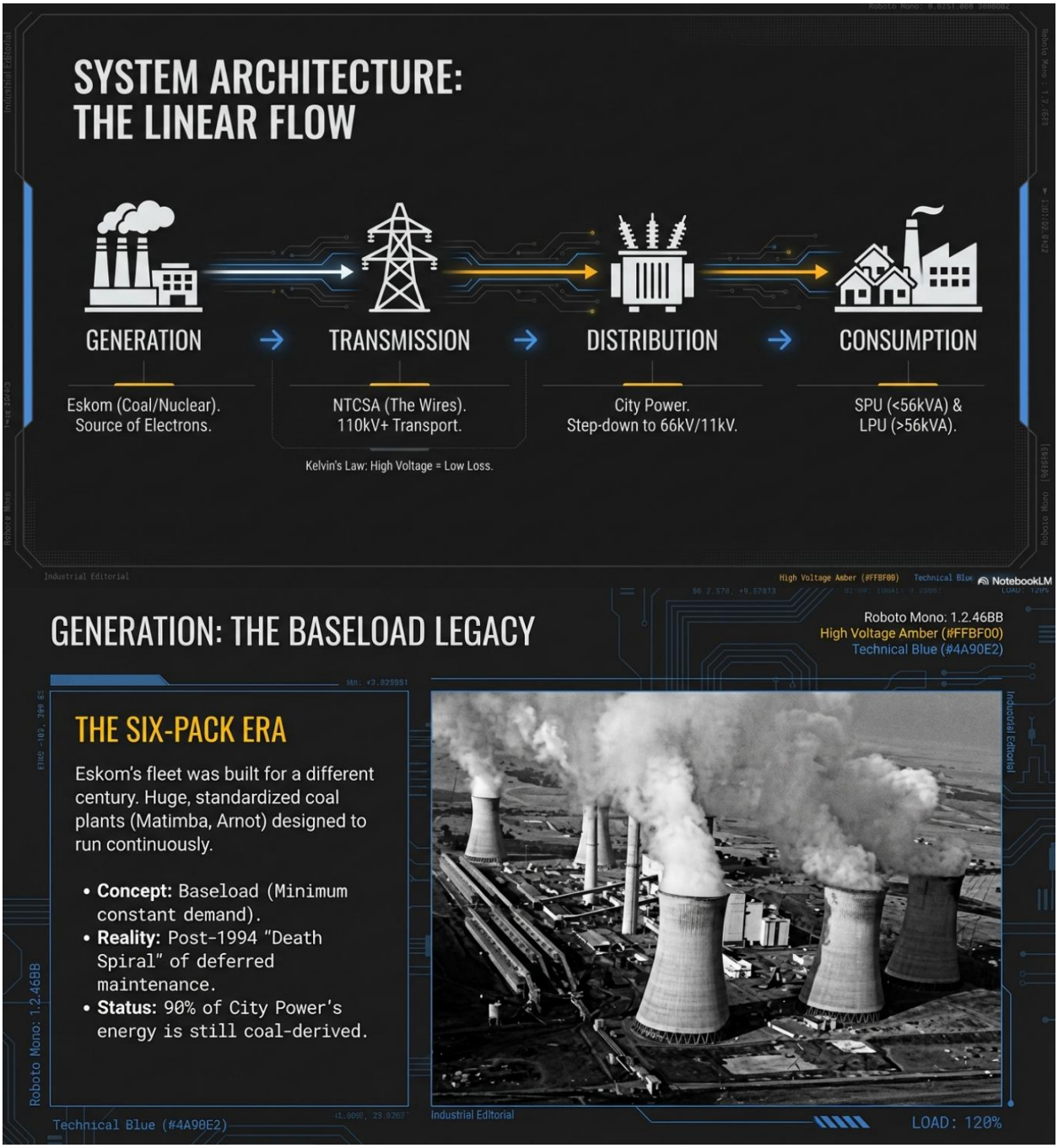
Develop with essential tools like Python, TensorFlow, OpenCV, and MySQL.

Real-World Training Objectives

Machine Learning | **Neural Networks** | **Object Tracking** | **Pathfinding**

NotebookLM


DECENTRALIZED GRID
SMALL PRODUCERS
BIDIRECTIONAL FLOW
ACTIVE CONSUMERS
ACTIVE CONSUMERS
FROM BASELOAD TO BLACKOUTS
The Anatomy of a Crisis: A Systems-Level Analysis of Grid Dynamics through the Lens of South Africa's Energy Transition
GLOBAL CONTEXT: AI & EV Demand Surge
LOCAL REALITY: Infrastructure Collapse & Debt
NotebookLM
THE GRID IN TENSION: AN EXECUTIVE SUMMARY
THE PROTAGONISTS
ESKOM
(Generation/Transmission):
State monopoly.
Aging Coal Fleet.
R423bn Debt
CITY POWER
(Distribution):
Municipal entity.
Buys 90% from Eskom.
R200m/year theft loss.
RELIABILITY
LOAD: 120%
STRESS: CRITICAL
LOAD: 128%
VOLTAGE DIPS
SUSTAINABILITY
COST
THE CONFLICT
Global: Shift to Decentralization (Wind/Solar).
Local: Anchored in Coal & Mining Politics.
Result: The Trilemma is broken.
RELIABILITY
SUSTAINABILITY
COST
NotebookLM


SYSTEM ARCHITECTURE:
THE LINEAR FLOW
GENERATION
TRANSMISSION
DISTRIBUTION
CONSUMPTION
Eskom (Coal/Nuclear).
Source of Electrons.
NTCSA (The Wires).
110kV+ Transport.
City Power.
Step-down to 66kV/11kV.
SPU (<56kVA) &
LPU (>56kVA).
Kelvin's Law: High Voltage = Low Loss.
Industrial Editorial
NotebookLM
GENERATION: THE BASELOAD LEGACY
Roboto Mono: 1.2.46BB
High Voltage Amber (#FFBF00)
Technical Blue (#4A90E2)
THE SIX-PACK ERA
Eskom's fleet was built for a different century. Huge, standardized coal plants (Matimba, Arnot) designed to run continuously.
• Concept: Baseload (Minimum constant demand).
• Reality: Post-1994 "Death Spiral" of deferred maintenance.
• Status: 90% of City Power's energy is still coal-derived.
Industrial Editorial
Technical Blue (#4A90E2)
Industrial Editorial
LOAD: 120%

THE ENERGY MIX TRANSITION

SYNCHRONOUS VS. INVERTER

Moving from heavy spinning mass (stable frequency) to variable renewable energy (Solar/Wind).

IRP Goals: 14,400 MW Wind, 6,000 MW Solar PV.

Constraint: Mining sector employment & grid stability.

Strategy: Independent Power Producers (IPPs) to reduce reliance on Eskom.

TRANSMISSION: THE HIGH-VOLTAGE BACKBONE

THE PHYSICS:
Kelvin's Law dictating High Voltage to minimize resistive loss.

THE RISKS:
Cascading Failures.

Entity:
National Transmission Company of SA (NTCSA) - Separating the "Wires" from the "Generation".

DISTRIBUTION: THE LAST MILE CRISIS

3.2 MILLION
People served in Joburg

R200 MILLION
Spent annually replacing stolen mini-substations

390 UNITS
Transformers replaced in 2023

City Power's battle is not just physics; it is against theft, vandalism, and the collapse of the 66kV/11kV network.

NotebookLM

OPERATIONAL RISKS: SABOTAGE & EXTRACTION

TOP SECRET CLASSIFIED CORRUPTION CASE FILE

Oswald

LETHABO INCIDENT

Severed steel supports on coal conveyor (Nov 2021). Deliberate sabotage.

Date: NOV 2021
Type: SABOTAGE
Impact: CRITICAL INFRASTRUCTURE DAMAGE

EVIDENCE #01

[redacted] High Voltage Amber

SYSTEMIC RISK

STATE CAPTURE

R1.6bn extracted by Trillian Capital. R11.7bn in irregular coal contracts.

R1.6 BN EXTRACTED (TRILLIAN)
R11.7 BN IRREGULAR CONTRACTS
Status: ONGOING INVESTIGATION

Oswald

DEBT CRISIS

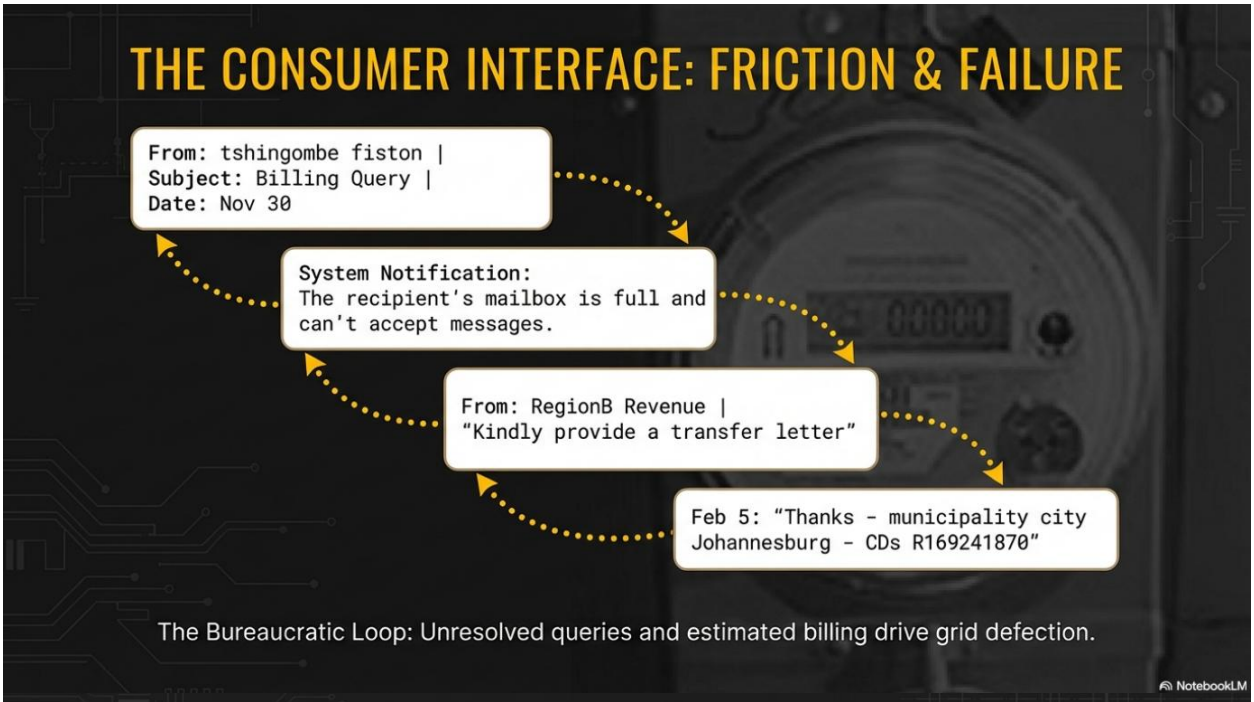
City Power ordered by High Court to pay Eskom R1 billion immediately (June 2024).

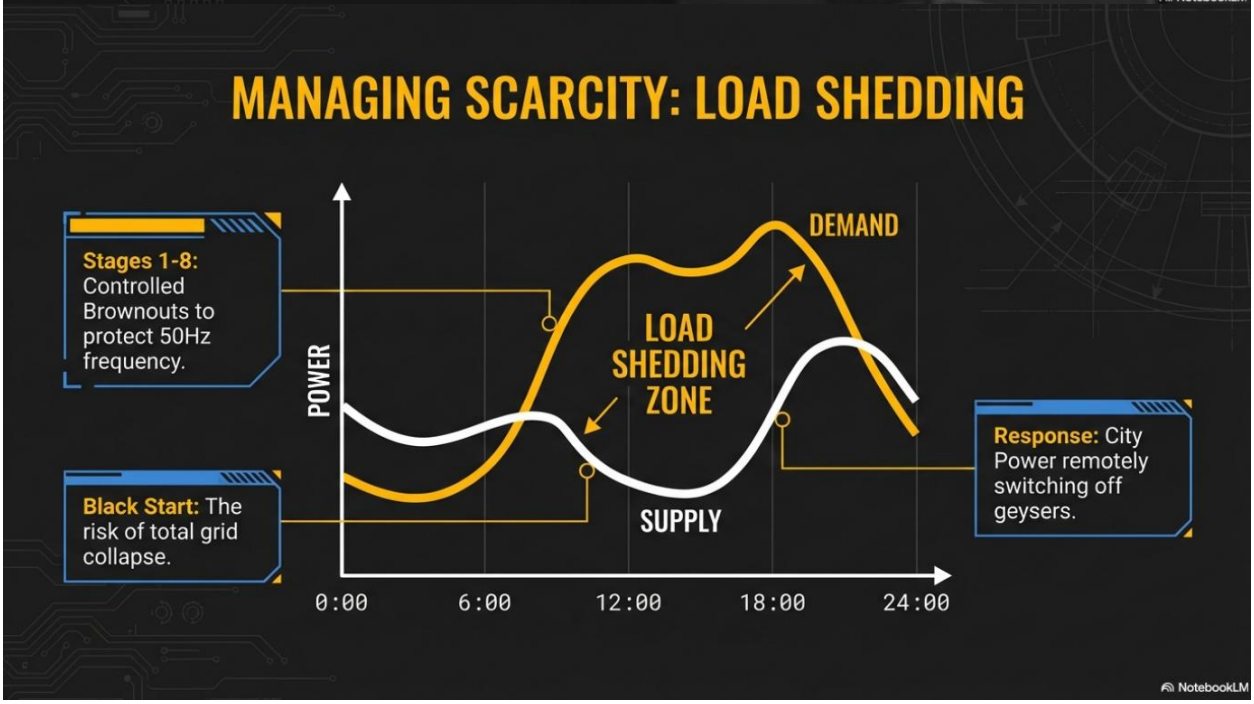
AMOUNT: R1 BILLION
DEADLINE: IMMEDIATELY (JUNE 2024)
Court Order: HIGH COURT

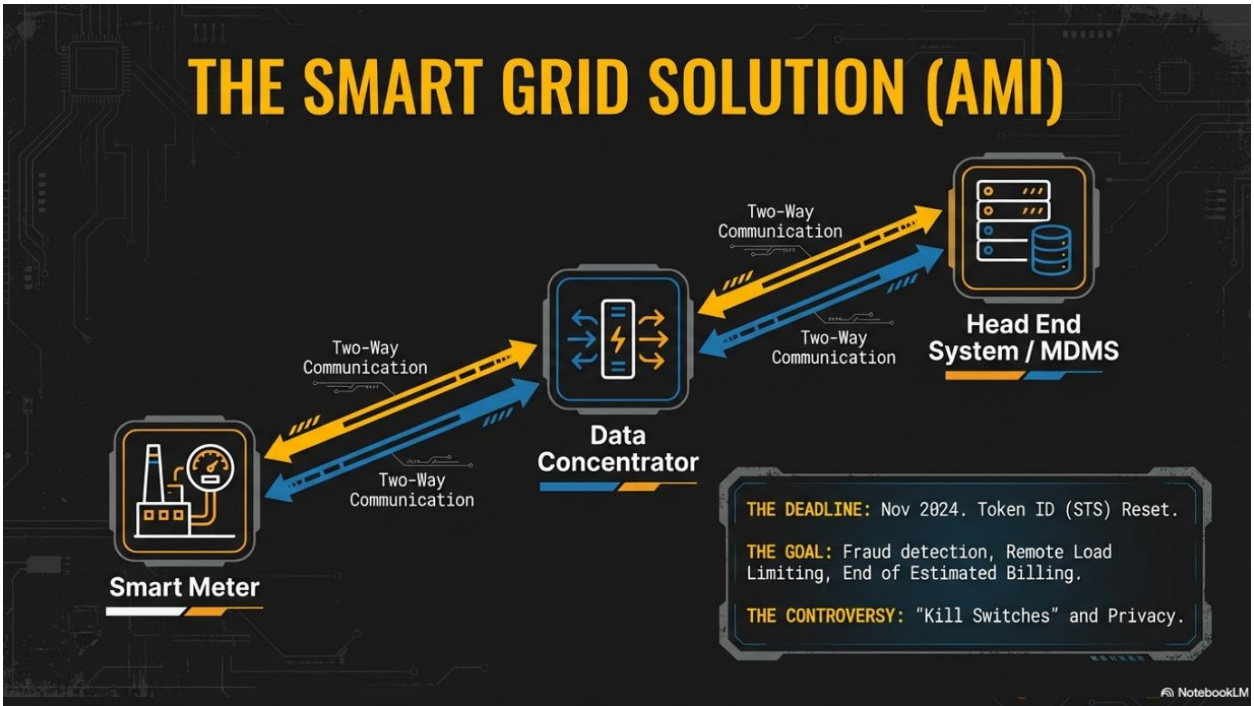
EVIDENCE #03

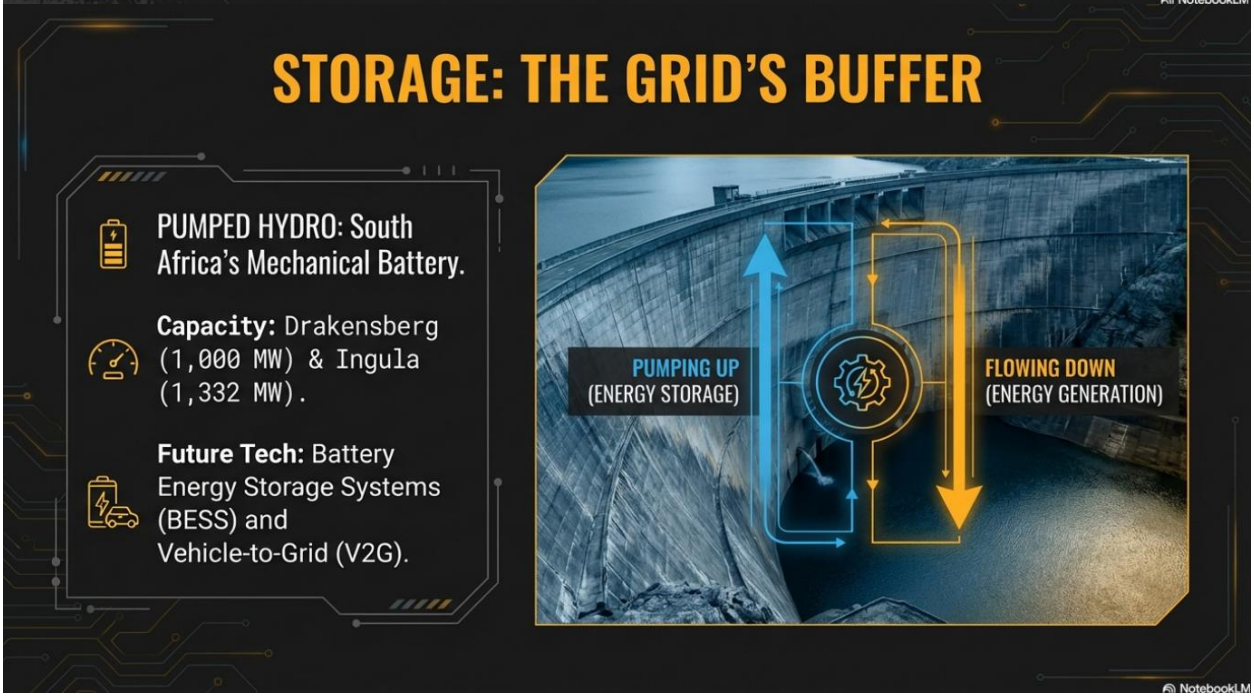
The greatest threats are not technical failures, but organized crime, political interference, and systemic corruption actively dismantling the grid.

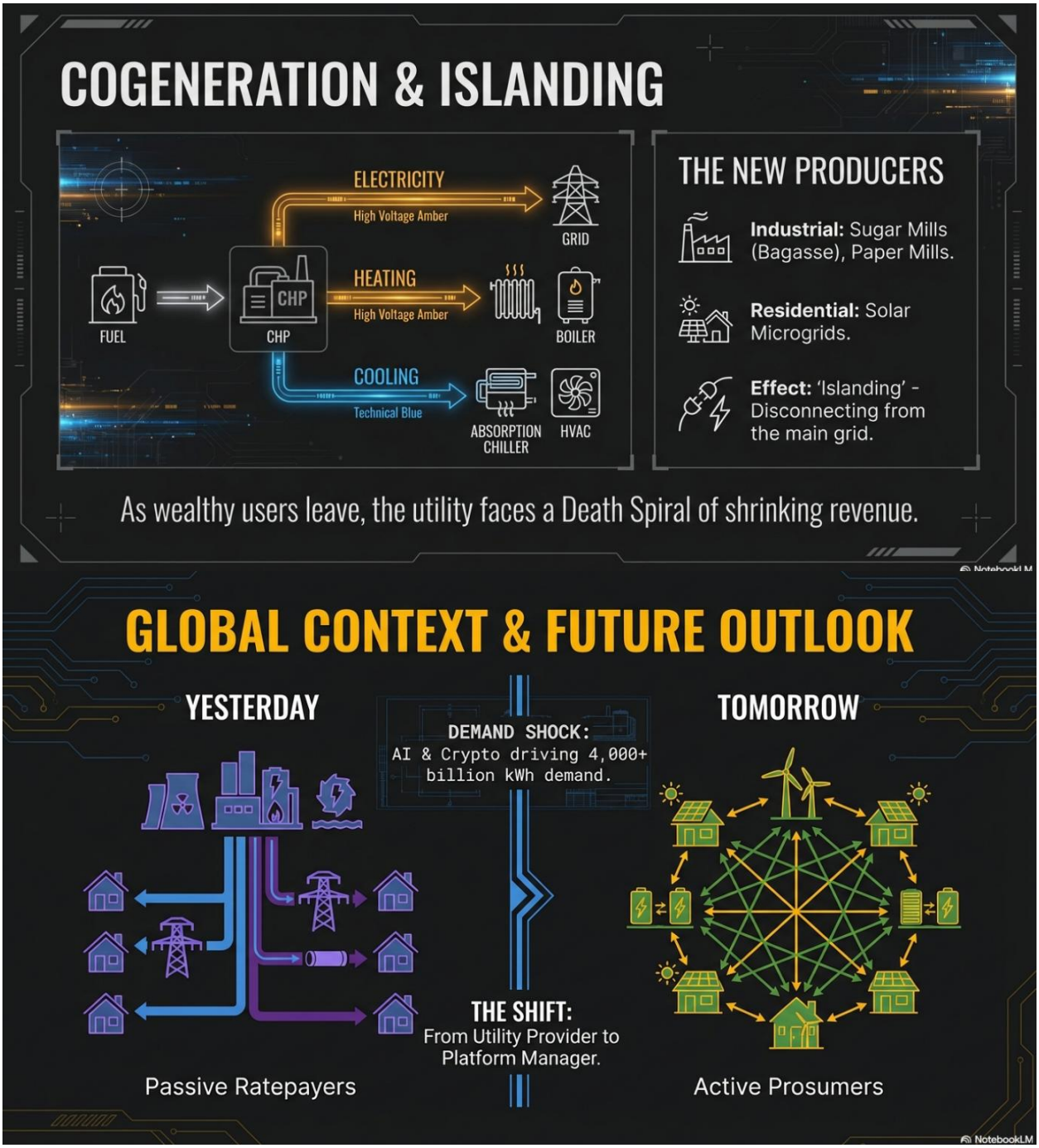
NotebookLM

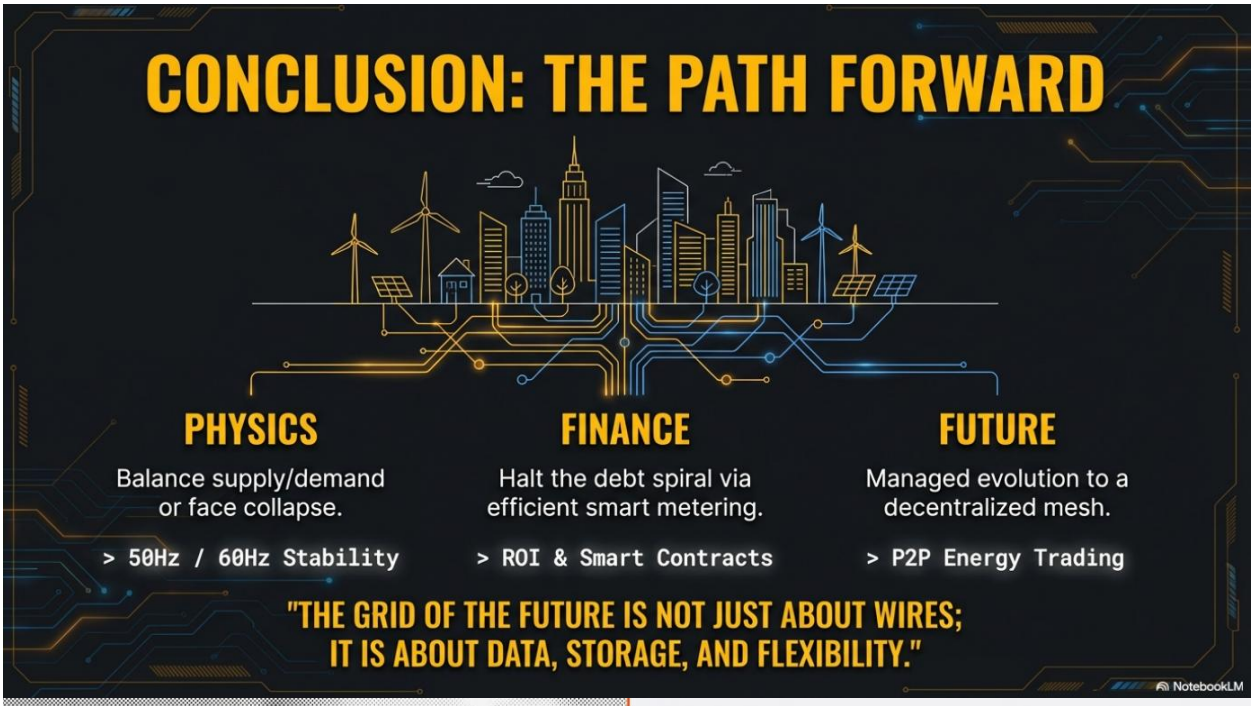

THE CONSUMER INTERFACE: FRICTION & FAILURE
From: tshingombe fiston |
Subject: Billing Query |
Date: Nov 30
System Notification:
The recipient's mailbox is full and can't accept messages.
From: RegionB Revenue |
"Kindly provide a transfer letter"
Feb 5: "Thanks - municipality city Johannesburg - CDs R169241870"
The Bureaucratic Loop: Unresolved queries and estimated billing drive grid defection.
NotebookLM

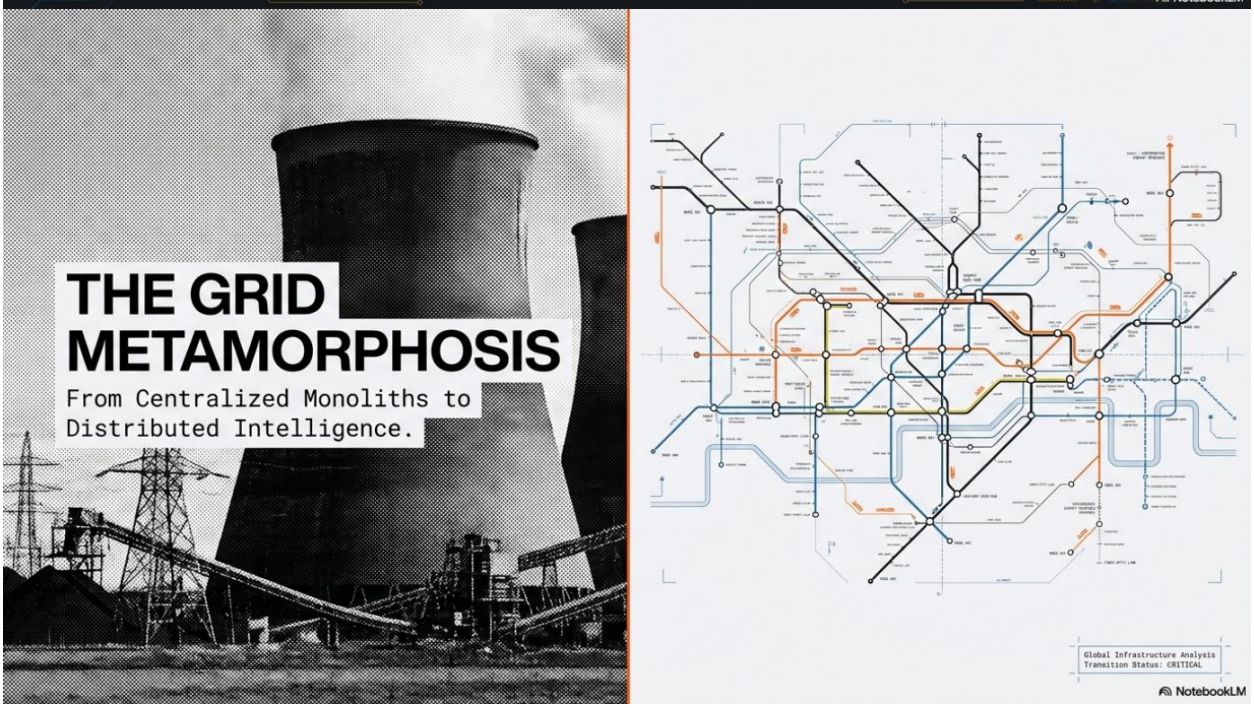

MANAGING SCARCITY: LOAD SHEDDING
Stages 1-8: Controlled Brownouts to protect 50Hz frequency.
Black Start: The risk of total grid collapse.
POWER
DEMAND
LOAD SHEDDING ZONE
SUPPLY
0:00
6:00
12:00
18:00
24:00
Response: City Power remotely switching off geysers.
NotebookLM


THE SMART GRID SOLUTION (AMI)
Two-Way Communication
Two-Way Communication
Two-Way Communication
Two-Way Communication
Head End System / MDMS
Data Concentrator
Smart Meter
THE DEADLINE: Nov 2024. Token ID (STS) Reset.
THE GOAL: Fraud detection, Remote Load Limiting, End of Estimated Billing.
THE CONTROVERSY: "Kill Switches" and Privacy.
NotebookLM


STORAGE: THE GRID'S BUFFER
PUMPED HYDRO: South Africa's Mechanical Battery.
Capacity: Drakensberg (1,000 MW) & Ingula (1,332 MW).
Future Tech: Battery Energy Storage Systems (BESS) and Vehicle-to-Grid (V2G).
PUMPING UP (ENERGY STORAGE)
FLOWING DOWN (ENERGY GENERATION)
NotebookLM

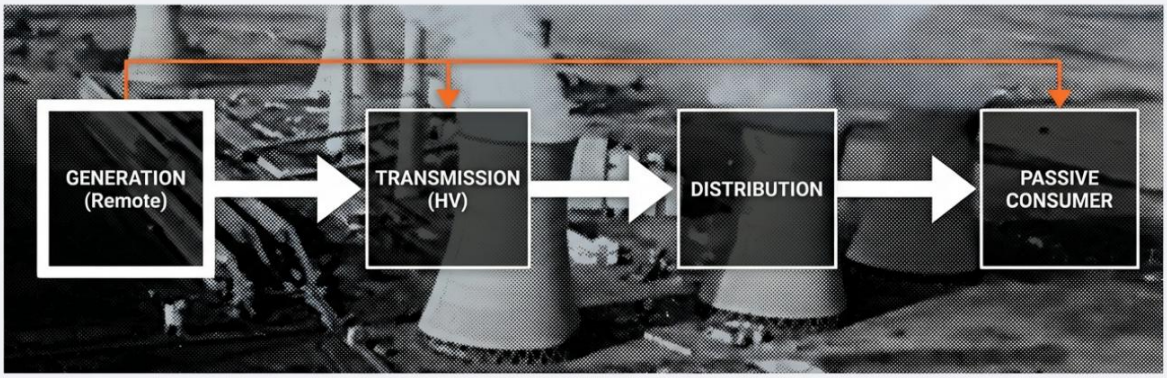

COGENERATION & ISLANDING
ELECTRICITY
High Voltage Amber
GRID
FUEL
CHP
CHP
HEATING
High Voltage Amber
BOILER
COOLING
Technical Blue
ABSORPTION CHILLER
HVAC
THE NEW PRODUCERS
Industrial: Sugar Mills (Bagasse), Paper Mills.
Residential: Solar Microgrids.
Effect: 'Islanding' - Disconnecting from the main grid.
As wealthy users leave, the utility faces a Death Spiral of shrinking revenue.
GLOBAL CONTEXT & FUTURE OUTLOOK
YESTERDAY
DEMAND SHOCK:
AI & Crypto driving 4,000+ billion kWh demand.
TOMORROW
THE SHIFT:
From Utility Provider to Platform Manager.
Passive Ratepayers
Active Prosumers
NotebookLM


CONCLUSION: THE PATH FORWARD
PHYSICS
Balance supply/demand or face collapse.
> 50Hz / 60Hz Stability
FINANCE
Halt the debt spiral via efficient smart metering.
> ROI & Smart Contracts
FUTURE
Managed evolution to a decentralized mesh.
> P2P Energy Trading
"THE GRID OF THE FUTURE IS NOT JUST ABOUT WIRES; IT IS ABOUT DATA, STORAGE, AND FLEXIBILITY."
NotebookLM


THE GRID METAMORPHOSIS
From Centralized Monoliths to Distributed Intelligence.
Global Infrastructure Analysis
Transition Status: CRITICAL
NotebookLM

THE LOGIC OF THE MONOLITH

Economies of Scale & Base Load Theory



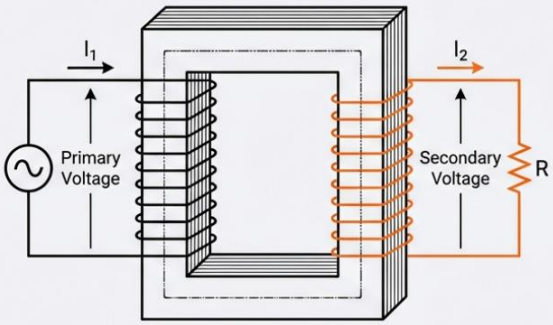
ERA:
1960–1990 Expansion.

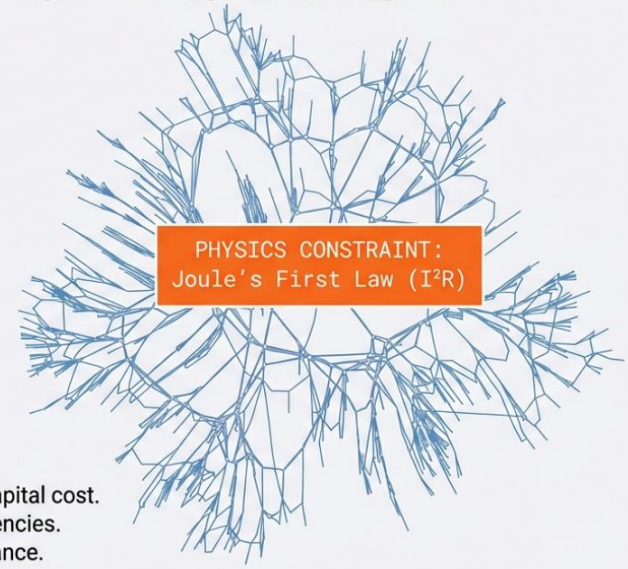
DESIGN:
The 'Six-Pack' Standard (6x Large Generator Units).

PHILOSOPHY:
Base Load efficiency via massive scale.

NotebookLM

THE TYRANNY OF DISTANCE



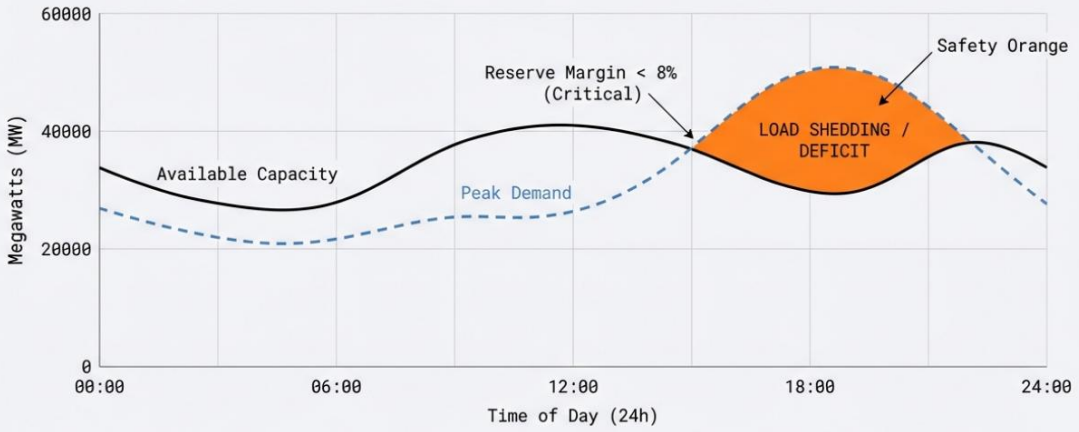


- Energy loss is proportional to the square of the current.
- Kelvin's Law: Balancing wasted energy vs. conductor capital cost.
- The Skin Effect: Resistance increases at high AC frequencies.
- **Solution**: Step-up voltage to minimize current over distance.

NotebookLM

THE BREAKING POINT

When Demand Outstrips Supply

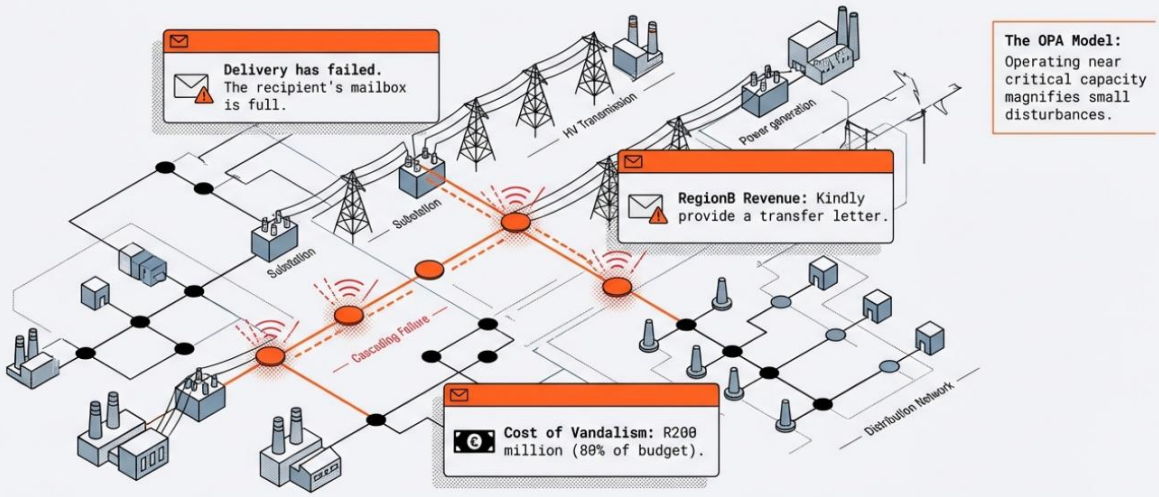


Load Shedding: A controlled mechanism to prevent total grid collapse (Black Start scenario).

NotebookLM

Engineering Editorial

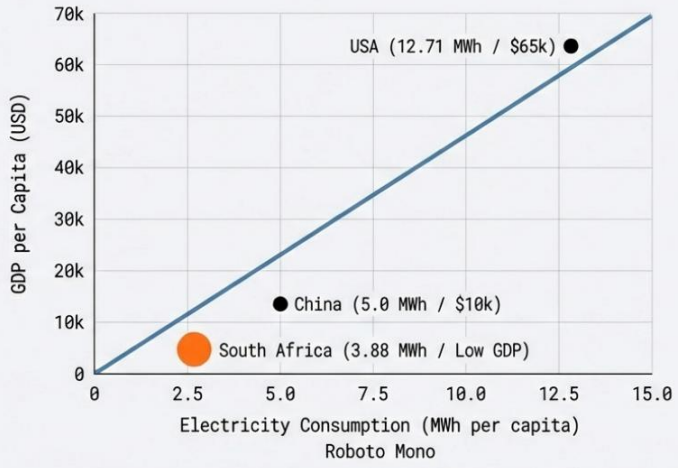
ANATOMY OF FAILURE: CITY POWER CASE STUDY

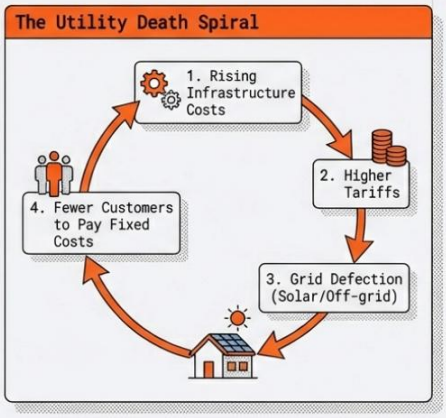


NotebookLM

THE ECONOMIC EQUATION

in Ink Black Helvetica Now Display



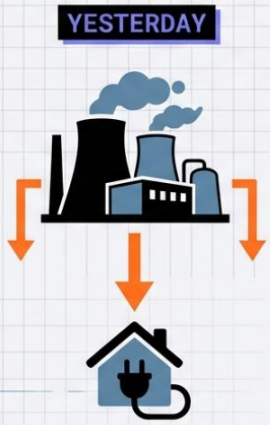

The Utility Death Spiral
1. Rising Infrastructure Costs
2. Higher Tariffs
3. Grid Defection (Solar/Off-grid)
4. Fewer Customers to Pay Fixed Costs

NotebookLM

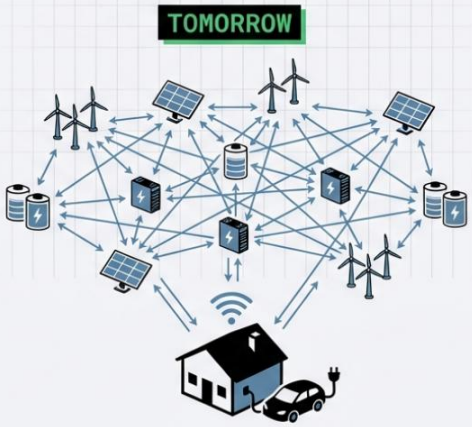
Engineering Editorial

ENTER THE SMART GRID

From Dumb Pipe to Digital Nervous System

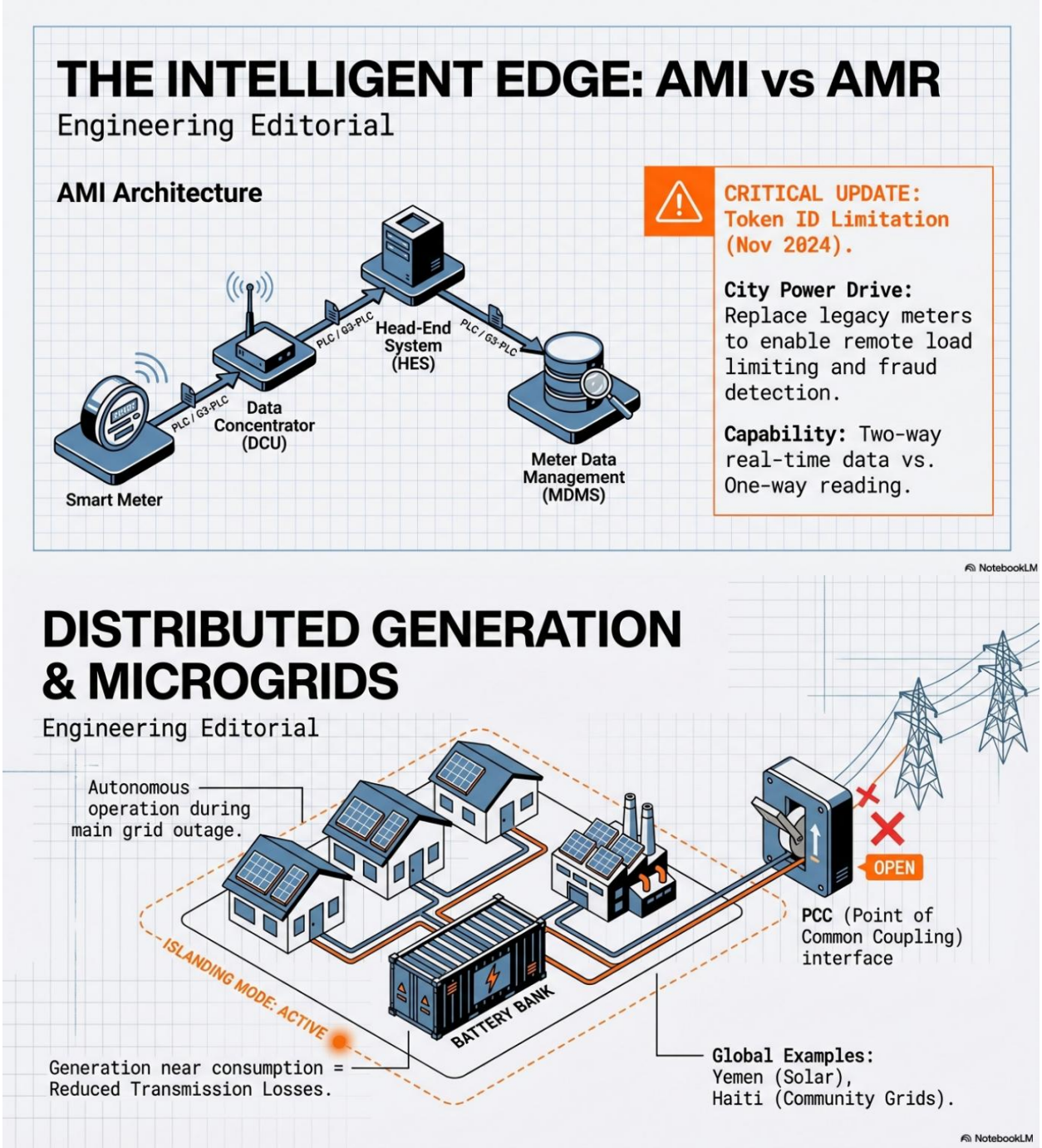


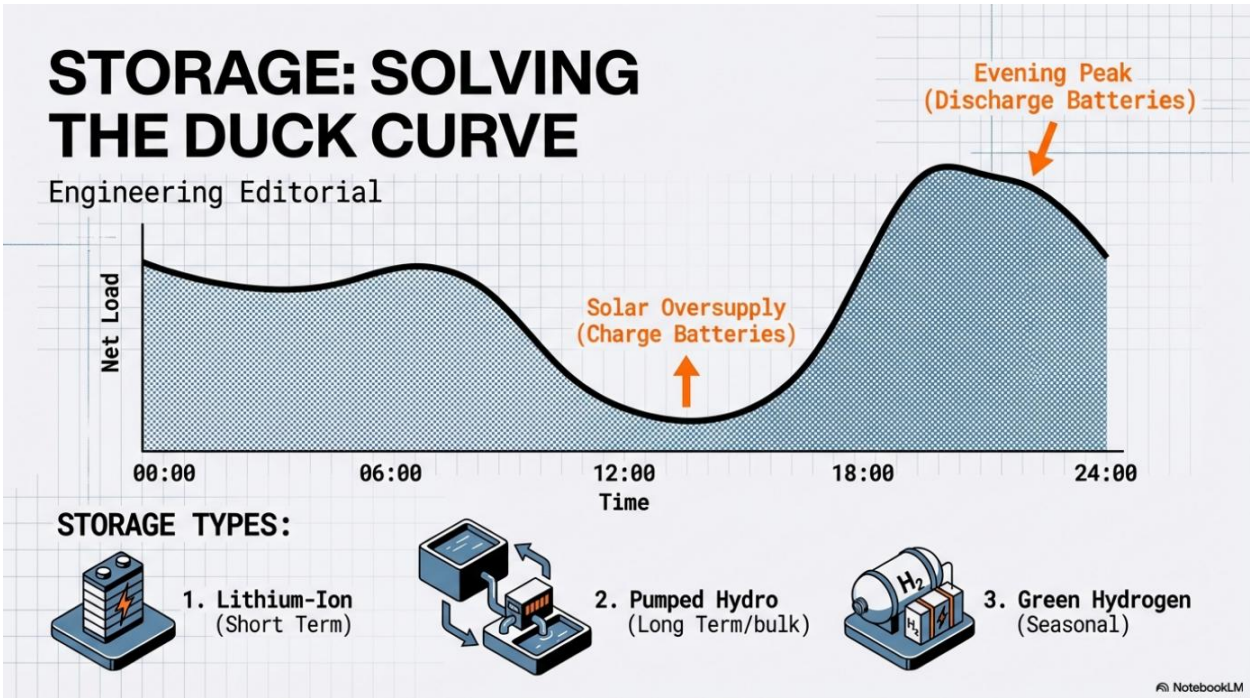
One-Way / Passive / Centralized

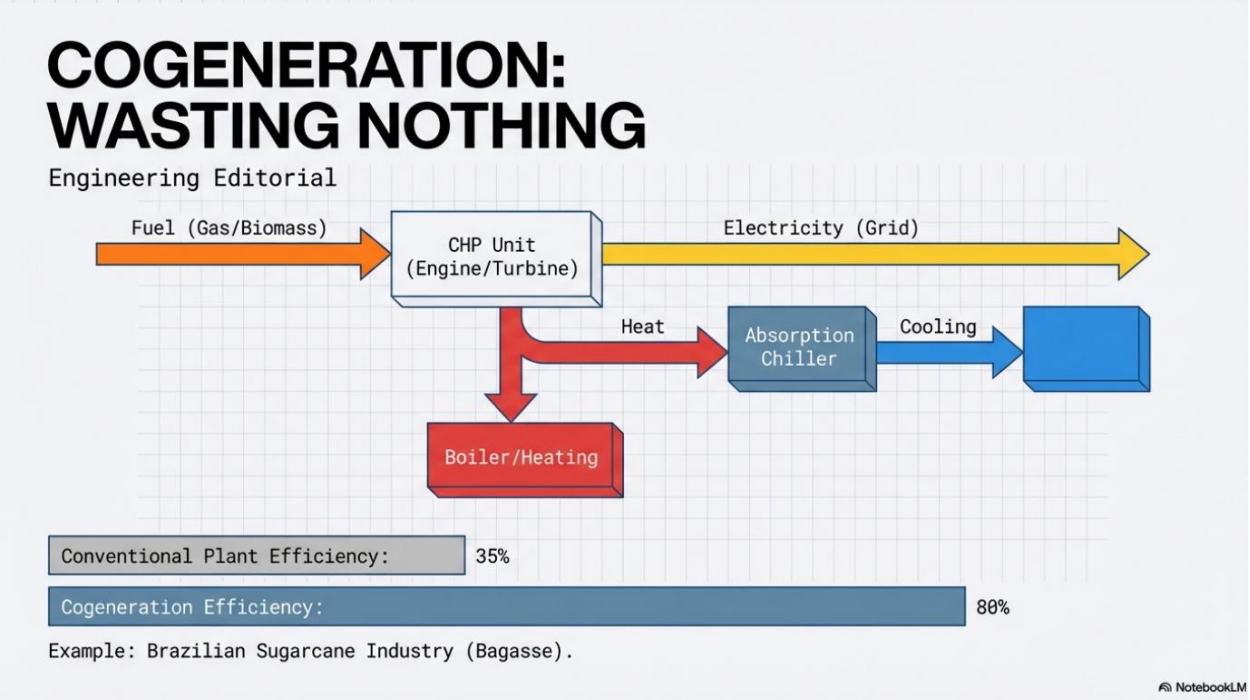


Two-Way / Active / Decentralized

NotebookLM

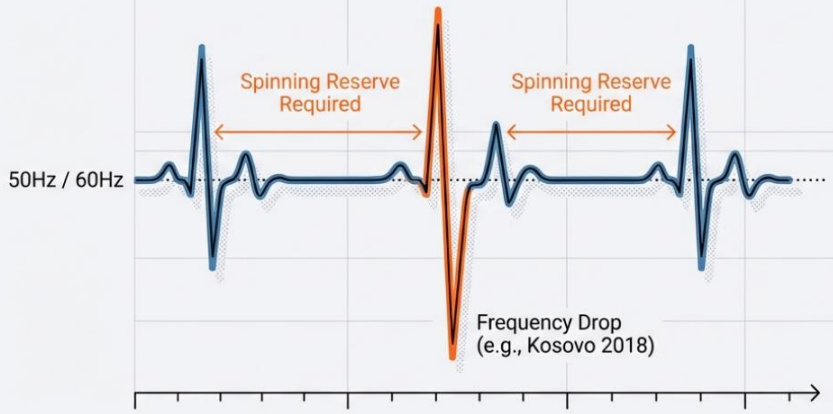

THE INTELLIGENT EDGE: AMI vs AMR
Engineering Editorial
AMI Architecture
Smart Meter
PLC / G3-PLC
Data Concentrator (DCU)
PLC / G3-PLC
Head-End System (HES)
PLC / G3-PLC
Meter Data Management (MDMS)
CRITICAL UPDATE: Token ID Limitation (Nov 2024).
City Power Drive: Replace legacy meters to enable remote load limiting and fraud detection.
Capability: Two-way real-time data vs. One-way reading.
NotebookLM
DISTRIBUTED GENERATION & MICROGRIDS
Engineering Editorial
Autonomous operation during main grid outage.
ISLANDING MODE: ACTIVE
BATTERY BANK
OPEN
PCC (Point of Common Coupling) interface
Generation near consumption = Reduced Transmission Losses.
Global Examples: Yemen (Solar), Haiti (Community Grids).
NotebookLM


STORAGE: SOLVING THE DUCK CURVE
Engineering Editorial
Evening Peak (Discharge Batteries)
Net Load
Solar Oversupply (Charge Batteries)
00:00
06:00
12:00
18:00
24:00
Time
STORAGE TYPES:
1. Lithium-Ion (Short Term)
2. Pumped Hydro (Long Term/bulk)
3. Green Hydrogen (Seasonal)
NotebookLM


COGENERATION: WASTING NOTHING
Engineering Editorial
Fuel (Gas/Biomass)
CHP Unit (Engine/Turbine)
Electricity (Grid)
Heat
Absorption Chiller
Cooling
Boiler/Heating
Conventional Plant Efficiency:
35%
Cogeneration Efficiency:
80%
Example: Brazilian Sugarcane Industry (Bagasse).
NotebookLM

THE RENEWABLE INTEGRATION CHALLENGE

Firm vs. Variable Capacity



Variable Sources (Wind/Solar) lack inertia.

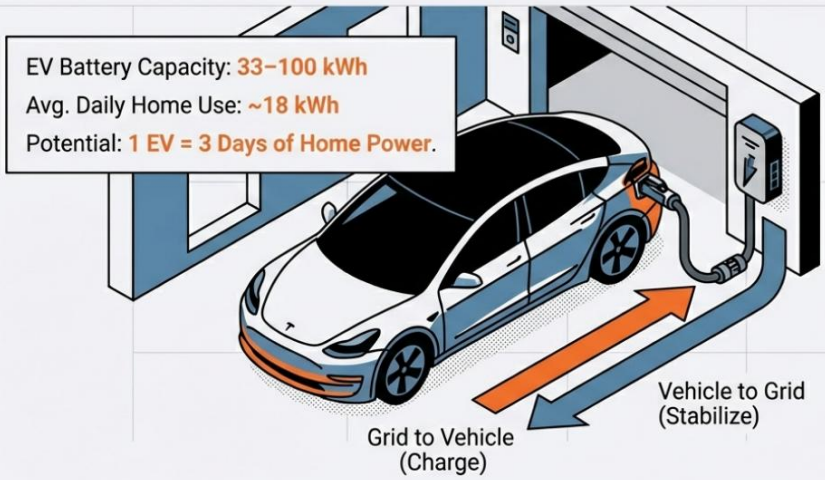
Firm Capacity (Coal/Nuclear) provides baseload.

South African Transition Deal: Funding coal exit vs. Mining employment risk.

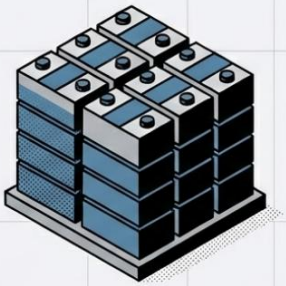
NotebookLM

THE NEW CONSUMER: EVs and V2G

Engineering Editorial

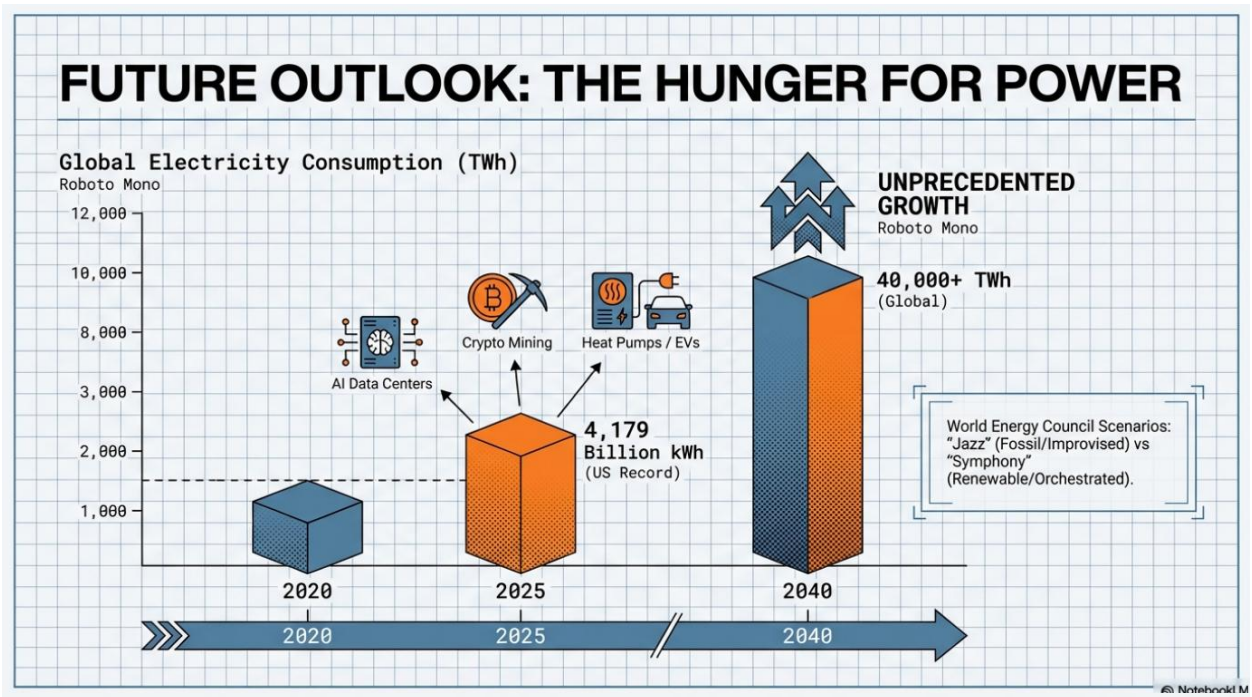

EV Battery Capacity: 33–100 kWh
Avg. Daily Home Use: ~18 kWh
Potential: 1 EV = 3 Days of Home Power.
Vehicle to Grid
(Stabilize)
Grid to Vehicle
(Charge)

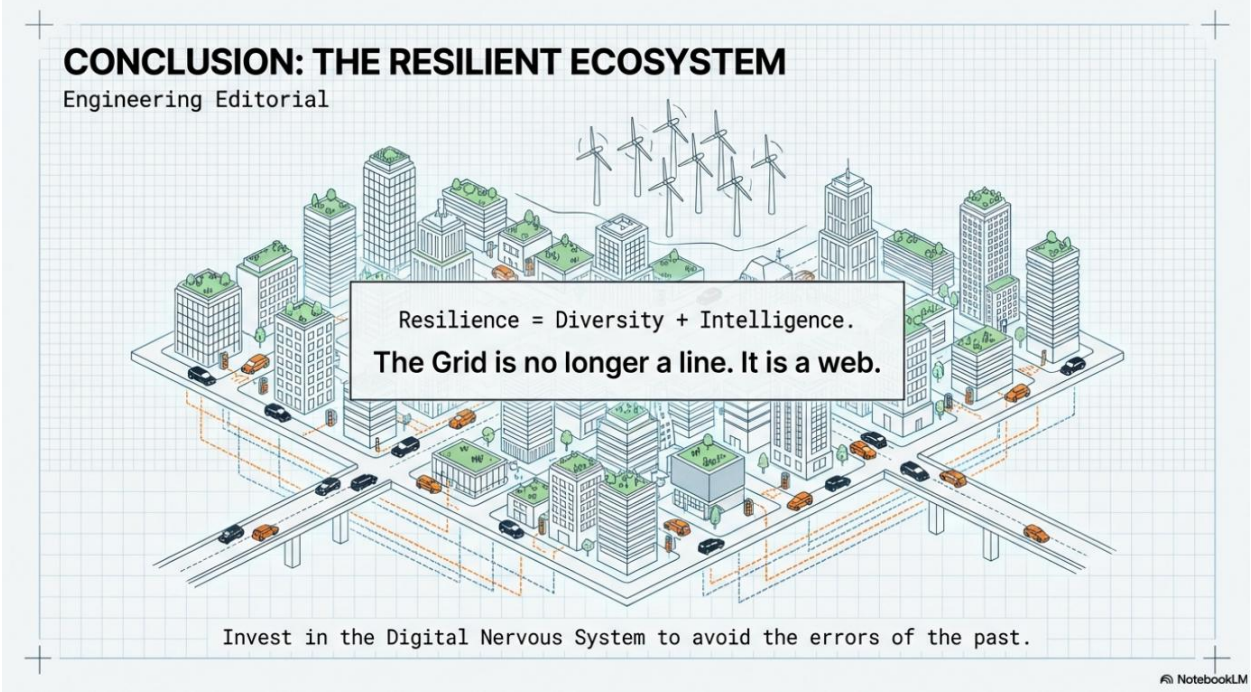
Second-Life Storage (Retire @ 80% Capacity)

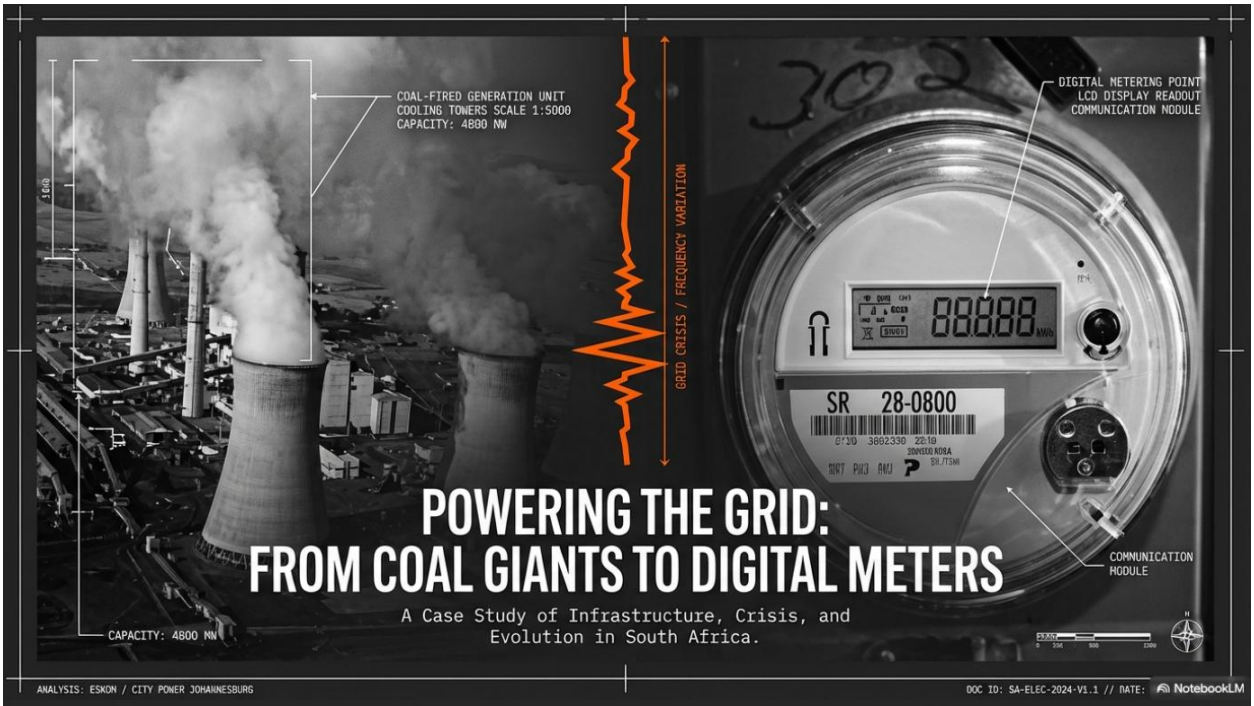


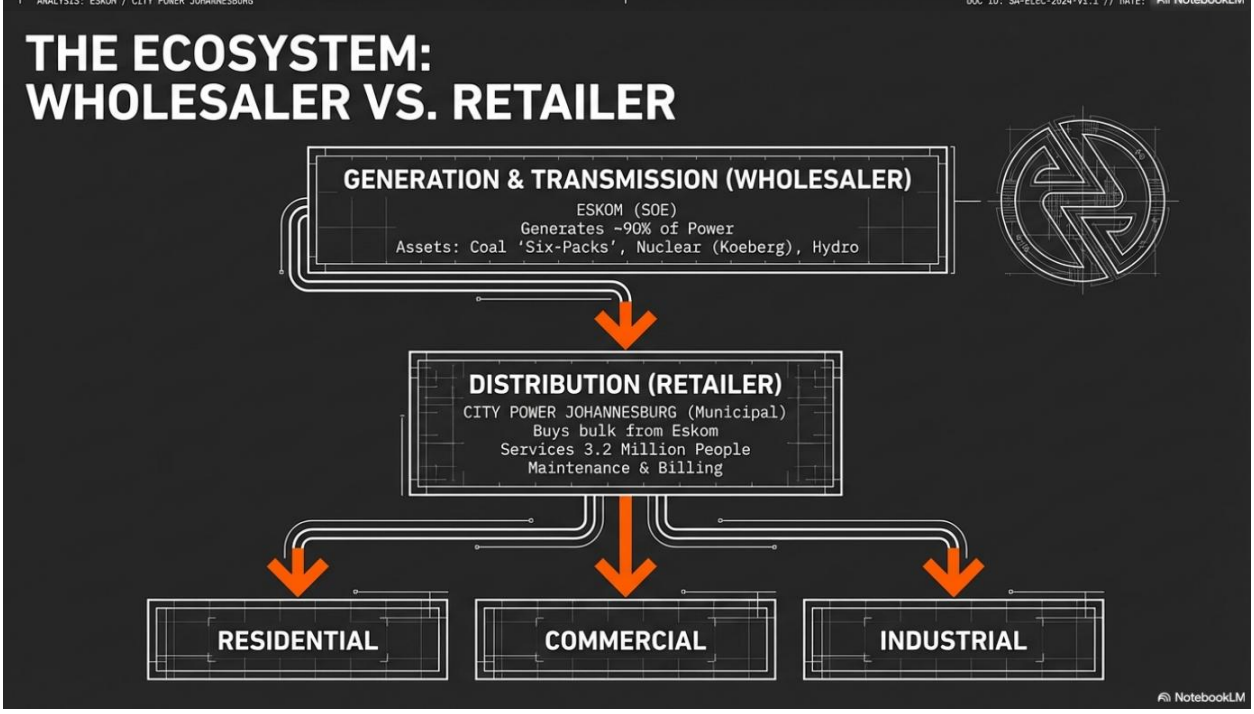
Example: Nissan Leaf batteries repurposing initiatives.

NotebookLM

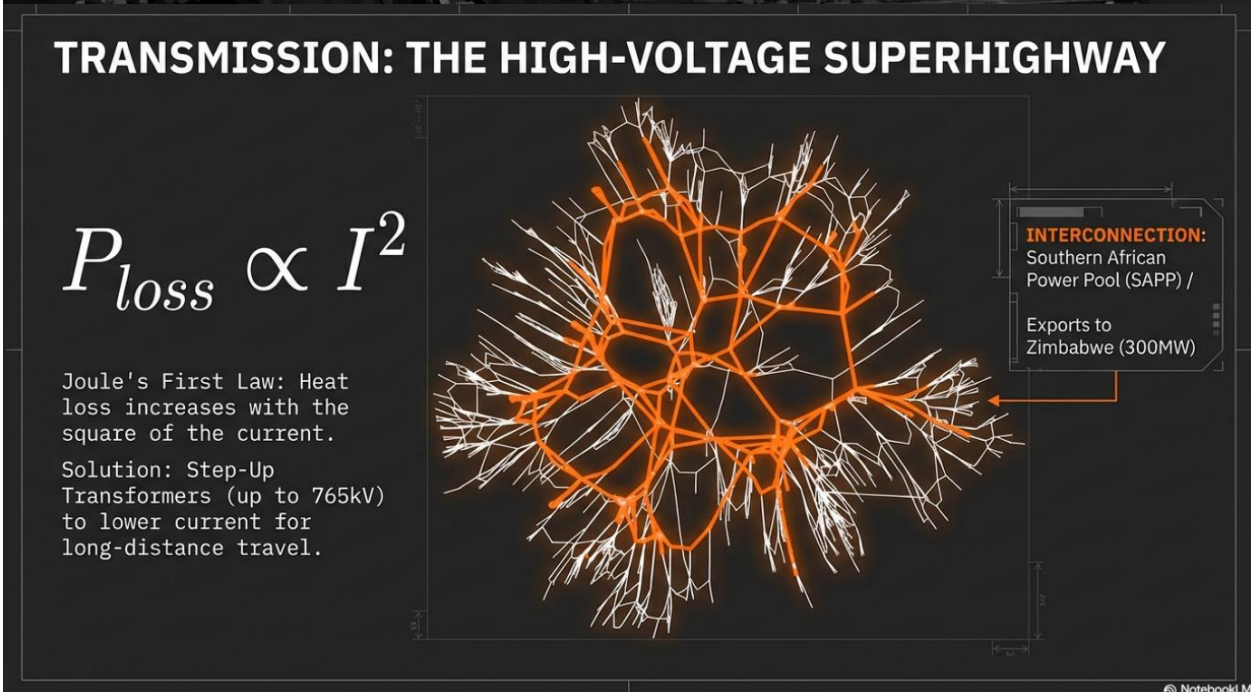

FUTURE OUTLOOK: THE HUNGER FOR POWER
Global Electricity Consumption (TWh)
Roboto Mono
12,000
10,000
8,000
3,000
2,000
1,000
AI Data Centers
Crypto Mining
Heat Pumps / EVs
4,179
Billion kWh
(US Record)
UNPRECEDENTED
GROWTH
Roboto Mono
40,000+ TWh
(Global)
World Energy Council Scenarios:
"Jazz" (Fossil/Improvised) vs
"Symphony"
(Renewable/Orchestrated).
2020
2025
2040
2020
2025
2040


CONCLUSION: THE RESILIENT ECOSYSTEM
Engineering Editorial
Resilience = Diversity + Intelligence.
The Grid is no longer a line. It is a web.
Invest in the Digital Nervous System to avoid the errors of the past.

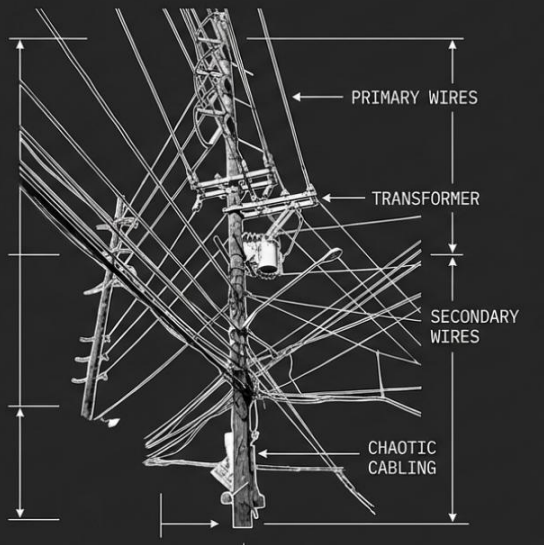

COAL-FIRED GENERATION UNIT
COOLING TOWERS SCALE 1:5000
CAPACITY: 4800 MW
GRID CRISIS / FREQUENCY VARIATION
DIGITAL METERING POINT
LCD DISPLAY READOUT
COMMUNICATION MODULE
SR 28-0800
COMMUNICATION MODULE
CAPACITY: 4800 MW
POWERING THE GRID:
FROM COAL GIANTS TO DIGITAL METERS
A Case Study of Infrastructure, Crisis, and Evolution in South Africa.
ANALYSIS: ESKOM / CITY POWER JOHANNESBURG
DOC ID: SA-ELEC-2024-V1.1 // DATE:
NotebookLM


THE ECOSYSTEM:
WHOLESALER VS. RETAILER
GENERATION & TRANSMISSION (WHOLESALER)
ESKOM (SOE)
Generates ~90% of Power
Assets: Coal 'Six-Packs', Nuclear (Koeberg), Hydro
DISTRIBUTION (RETAILER)
CITY POWER JOHANNESBURG (Municipal)
Buys bulk from Eskom
Services 3.2 Million People
Maintenance & Billing
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
NotebookLM

GENERATION: THE SOURCE OF FIRM CAPACITY
> BASELOAD:
Continuous minimum load.
Sources: Coal 'Six-Packs' (Matimba, Arnot), Nuclear (Koeberg).
> PEAKING POWER:
Rapid response for high demand.
Sources: OCGT (Gas), Pumped Hydro (Ingula).
> RENEWABLES:
Intermittent energy.
Sources: Wind (Sere Farm), Solar PV.
IBM Plex Mono
NotebookLM


TRANSMISSION: THE HIGH-VOLTAGE SUPERHIGHWAY
$P_{loss} \propto I^2$
Joule's First Law: Heat loss increases with the square of the current.
Solution: Step-Up Transformers (up to 765kV) to lower current for long-distance travel.
INTERCONNECTION:
Southern African Power Pool (SAPP) /
Exports to Zimbabwe (300MW)

DISTRIBUTION: STEPPING DOWN TO STREET LEVEL



INFRASTRUCTURE ANATOMY: IBM Plex Mono

1. **SUBSTATIONS:** The interface (Transmission -> Distribution).
2. **TRANSFORMERS:** Voltage conversion (11kV -> 220/380V).
3. **BUSBARS:** Copper/Aluminum conductors organizing current.
4. **CIRCUIT BREAKERS:** Automatic fault isolation.

CITY POWER CONTEXT:

Maintaining 390+ mini-substations.
Vulnerable to theft and surge damage.

IBM Plex Mono

NotebookLM

THE CONNECTION POINT: SPU VS. LPU

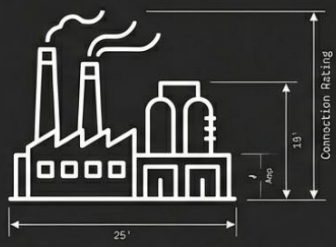
SPU (SMALL POWER USER)

< 56 kVA Connection (80 Amp)

Residential / Small Business.
Prepaid or Postpaid.

Connection Rating

LPU (LARGE POWER USER)



> 56 kVA Connection

Industrial / Shopping Centers /
High-Density Apts.
Requires 'Max Demand' Metering.

METERING

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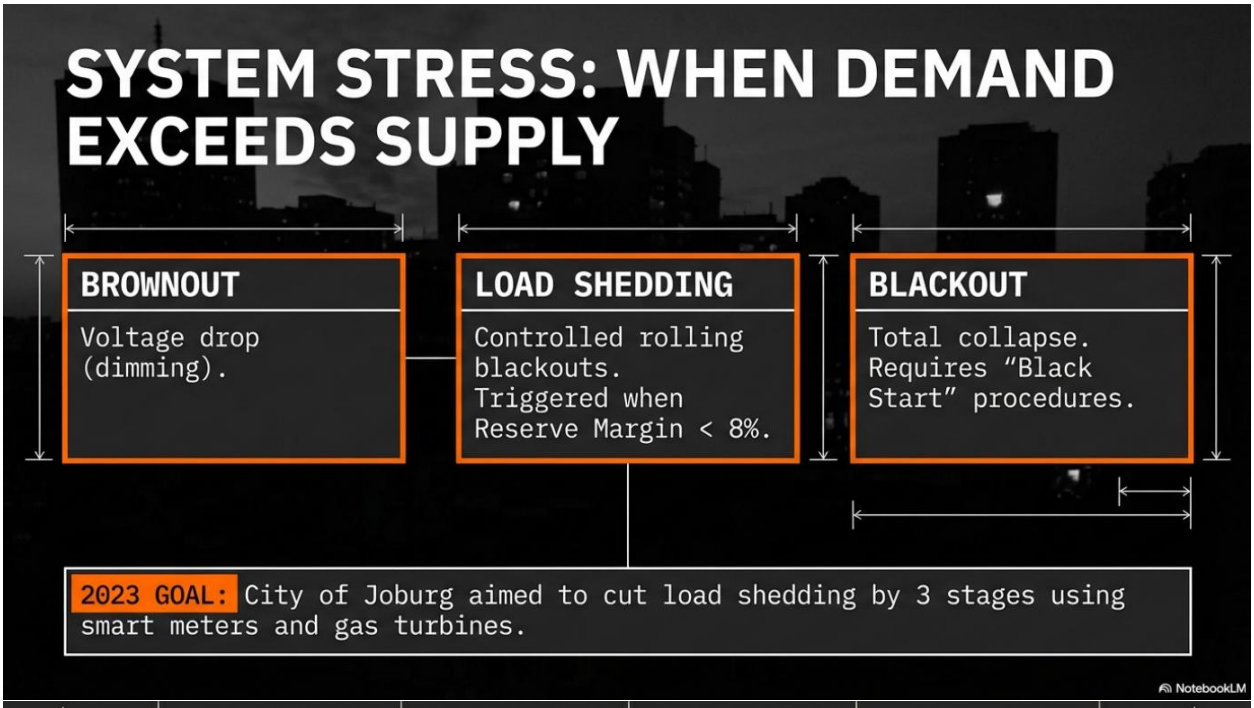
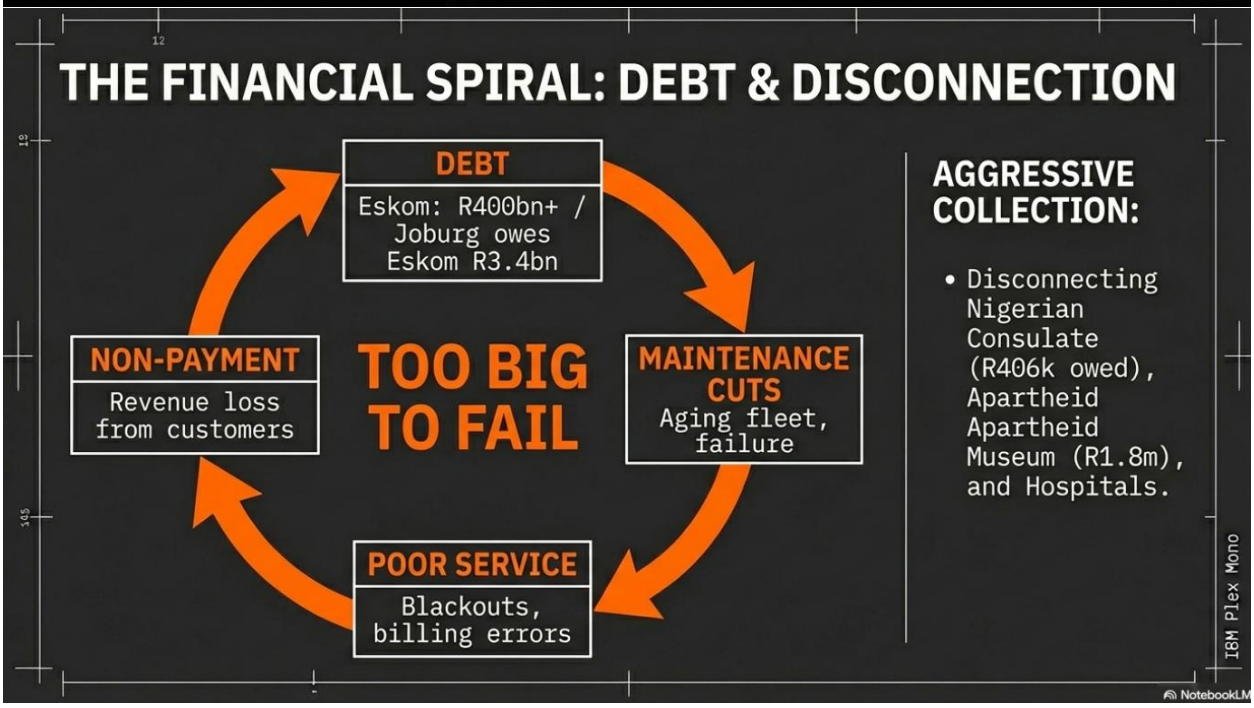
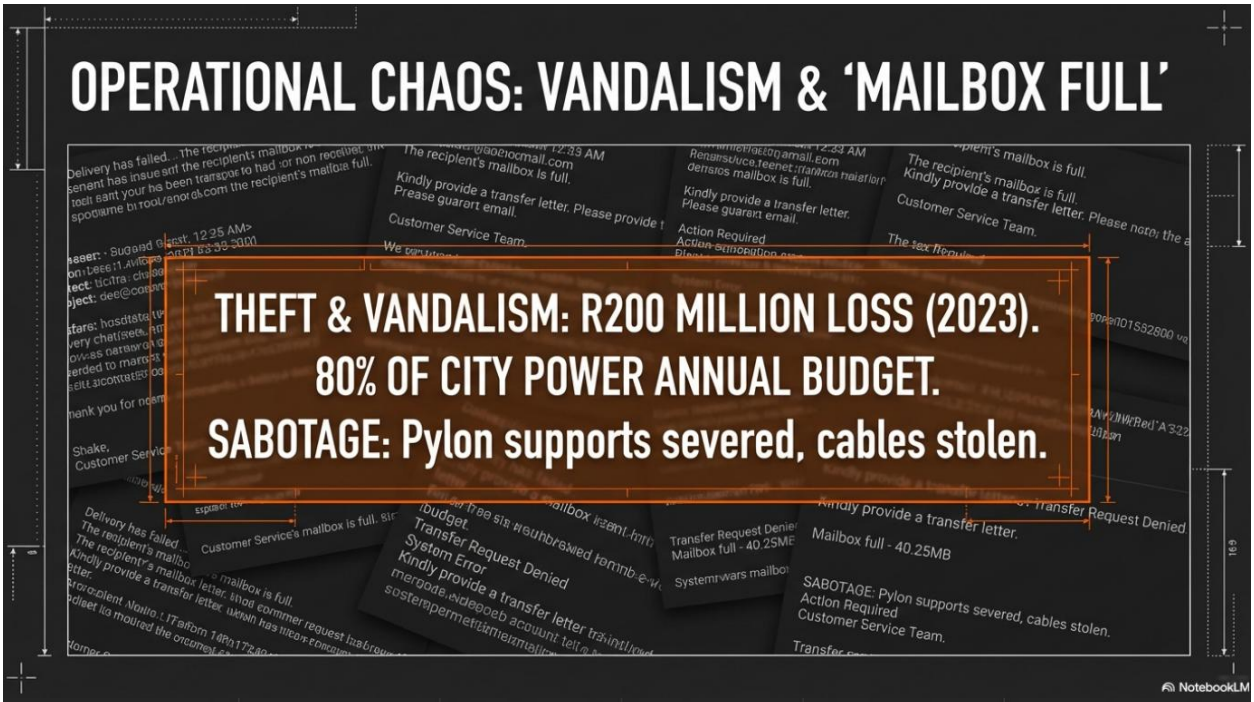
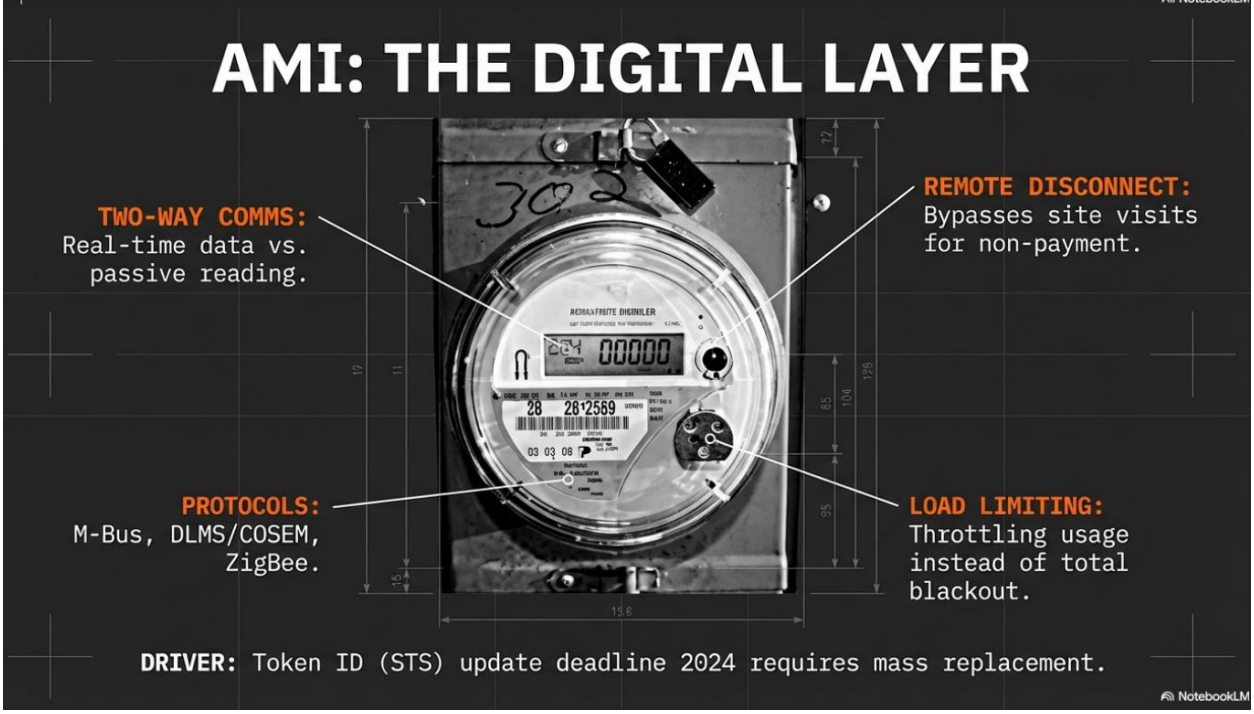
NotebookLM


SYSTEM STRESS: WHEN DEMAND EXCEEDS SUPPLY
BROWNOUT
Voltage drop (dimming).
LOAD SHEDDING
Controlled rolling blackouts. Triggered when Reserve Margin < 8%.
BLACKOUT
Total collapse. Requires "Black Start" procedures.
2023 GOAL: City of Joburg aimed to cut load shedding by 3 stages using smart meters and gas turbines.
NotebookLM

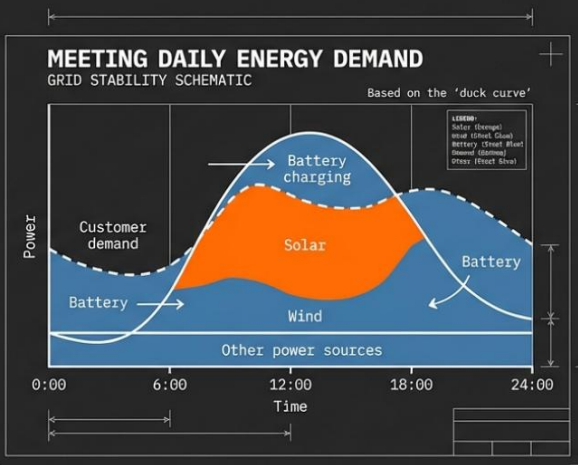

THE FINANCIAL SPIRAL: DEBT & DISCONNECTION
DEBT
Eskom: R400bn+ / Joburg owes Eskom R3.4bn
MAINTENANCE CUTS
Aging fleet, failure
POOR SERVICE
Blackouts, billing errors
NON-PAYMENT
Revenue loss from customers
TOO BIG TO FAIL
AGGRESSIVE COLLECTION:
• Disconnecting Nigerian Consulate (R406k owed), Apartheid Apartheid Museum (R1.8m), and Hospitals.
IBM Plex Mono
NotebookLM


OPERATIONAL CHAOS: VANDALISM & 'MAILBOX FULL'
THEFT & VANDALISM: R200 MILLION LOSS (2023).
80% OF CITY POWER ANNUAL BUDGET.
SABOTAGE: Pylon supports severed, cables stolen.
The recipient's mailbox is full.
Kindly provide a transfer letter.
Customer Service Team.
Transfer Request Denied
Mailbox full - 40.25MB
SABOTAGE: Pylon supports severed, cables stolen.
Action Required
NotebookLM


AMI: THE DIGITAL LAYER
TWO-WAY COMMS:
Real-time data vs. passive reading.
REMOTE DISCONNECT:
Bypasses site visits for non-payment.
PROTOCOLS:
M-Bus, DLMS/COSEM, ZigBee.
LOAD LIMITING:
Throttling usage instead of total blackout.
DRIVER: Token ID (STS) update deadline 2024 requires mass replacement.
NotebookLM

GRID ENERGY STORAGE: SOLVING INTERMITTENCY

- 1. PUMPED HYDRO: The 'Water Battery'. (Drakensberg / Ingula).
- 2. BESS (BATTERIES): Lithium-Ion (LFP) for frequency regulation.
- 3. FLOW BATTERIES: Long-duration storage.



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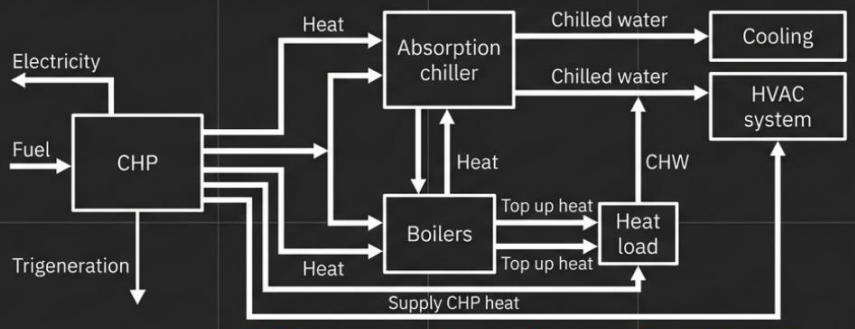
DECENTRALIZATION: COGENERATION & MICROGRIDS



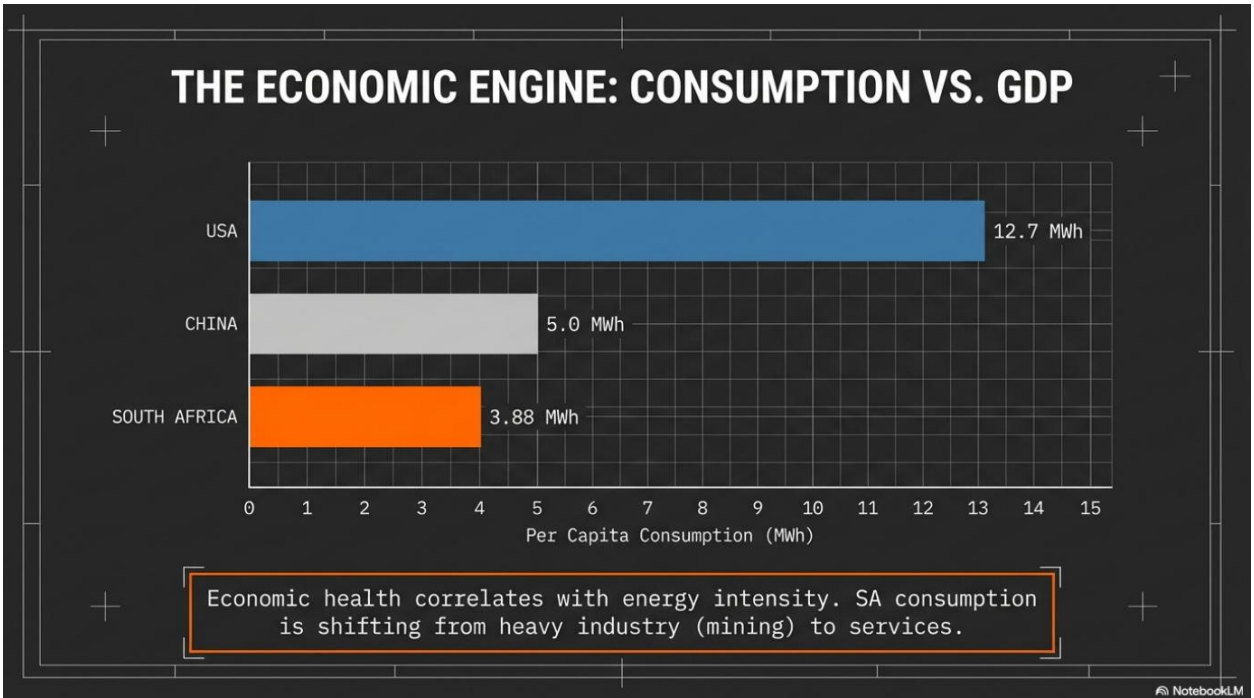
EFFICIENCY: Using waste heat for cooling/heating.

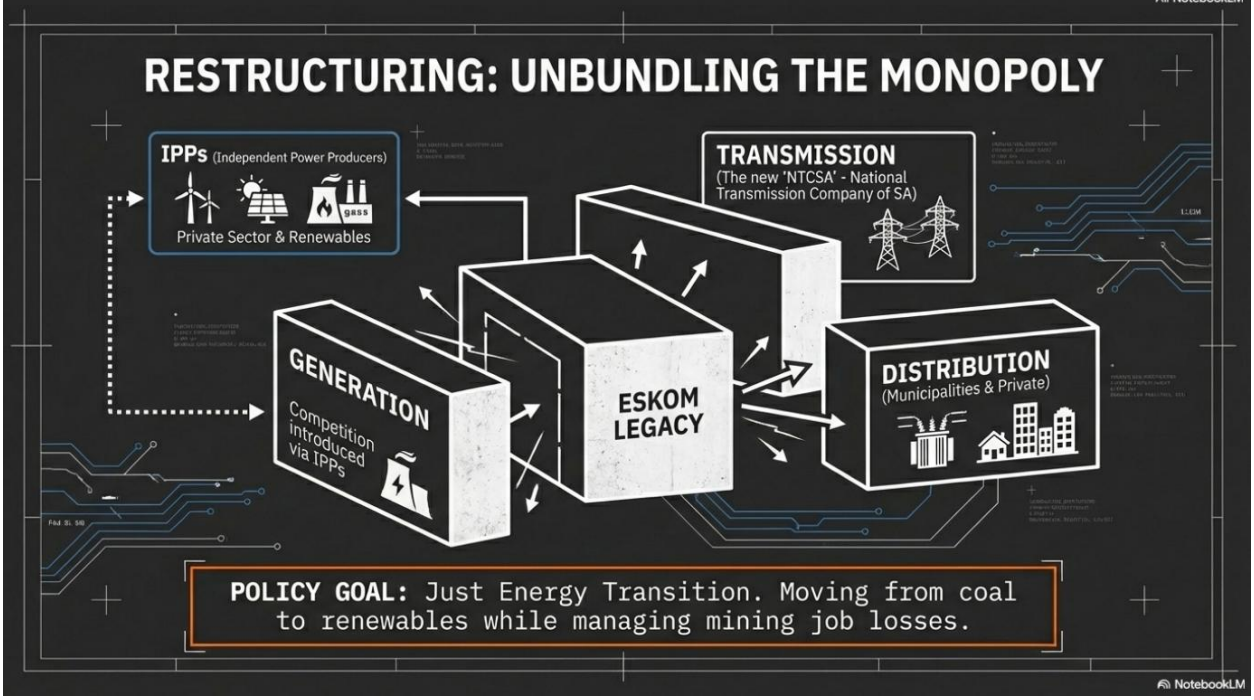
ISLANDING
The ability to disconnect from the main grid during outages. Autonomous operation.

GRID DEFECTION
Risk of wealthy users exiting the system (Solar PV), leaving legacy costs to the poor.

IBM Plex Mono

NotebookLM


THE ECONOMIC ENGINE: CONSUMPTION VS. GDP
USA
12.7 MWh
CHINA
5.0 MWh
SOUTH AFRICA
3.88 MWh
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Per Capita Consumption (MWh)
Economic health correlates with energy intensity. SA consumption is shifting from heavy industry (mining) to services.
NotebookLM


RESTRUCTURING: UNBUNDLING THE MONOPOLY
IPPs (Independent Power Producers)
Private Sector & Renewables
TRANSMISSION
(The new 'NTCSA' - National Transmission Company of SA)
GENERATION
Competition introduced via IPPs
ESKOM LEGACY
DISTRIBUTION
(Municipalities & Private)
POLICY GOAL: Just Energy Transition. Moving from coal to renewables while managing mining job losses.
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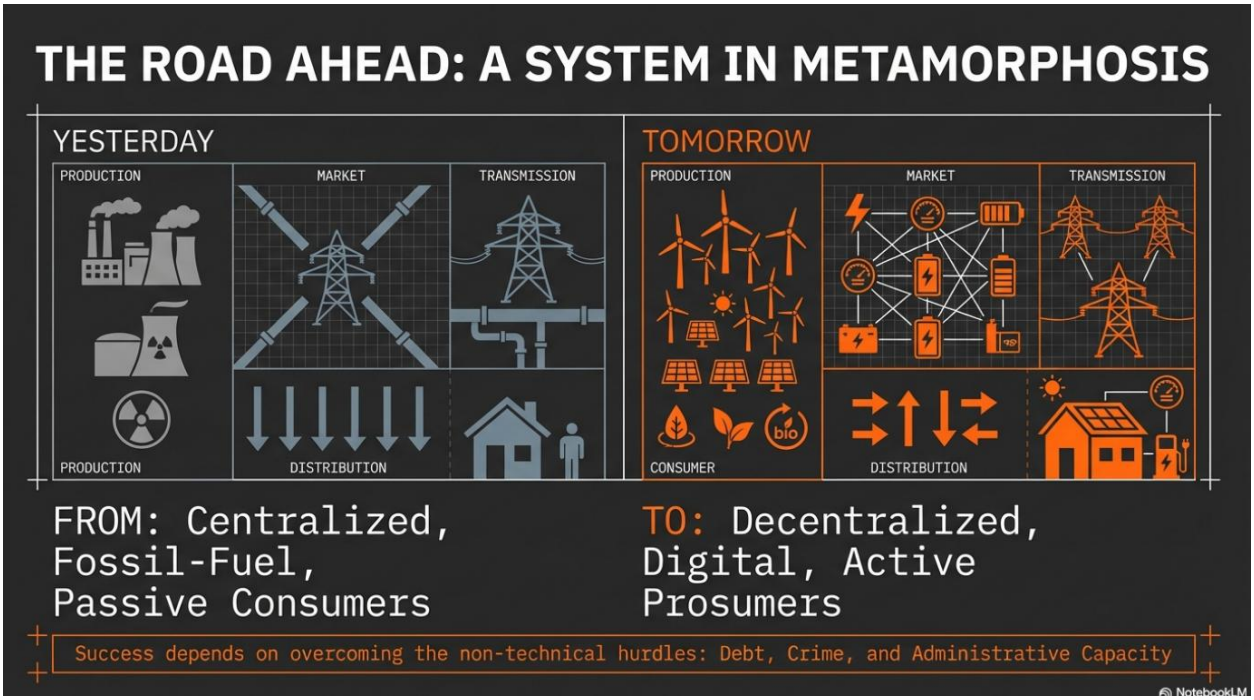
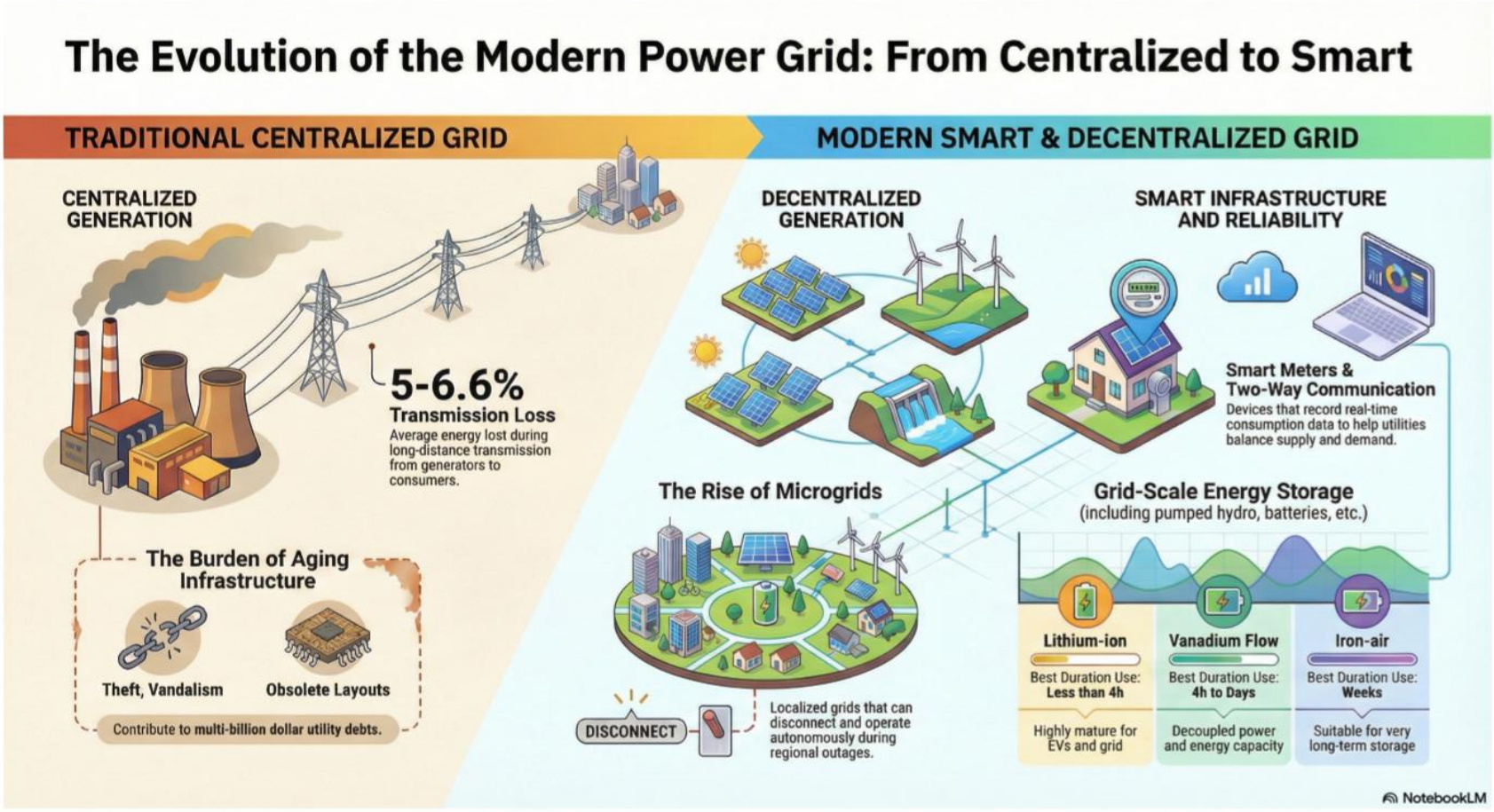
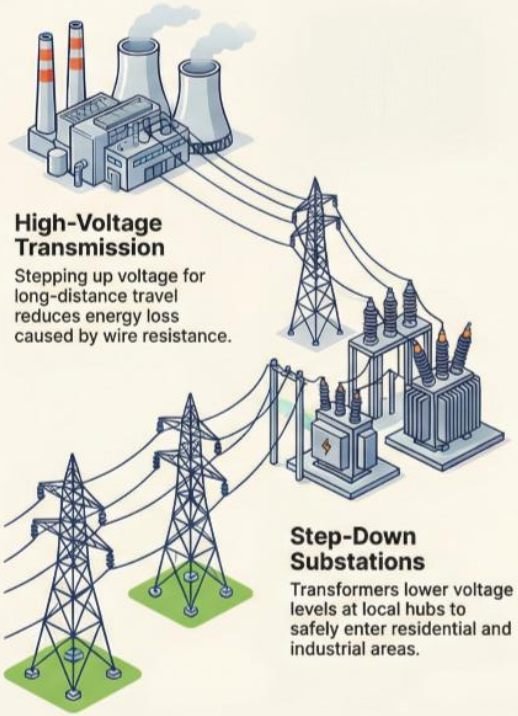

THE ROAD AHEAD: A SYSTEM IN METAMORPHOSIS
YESTERDAY
PRODUCTION
MARKET
TRANSMISSION
PRODUCTION
DISTRIBUTION
TOMORROW
PRODUCTION
MARKET
TRANSMISSION
CONSUMER
DISTRIBUTION
FROM: Centralized, Fossil-Fuel, Passive Consumers
TO: Decentralized, Digital, Active Prosumers
Success depends on overcoming the non-technical hurdles: Debt, Crime, and Administrative Capacity


The Evolution of the Modern Power Grid: From Centralized to Smart
TRADITIONAL CENTRALIZED GRID
MODERN SMART & DECENTRALIZED GRID
CENTRALIZED GENERATION
5-6.6%
Transmission Loss
Average energy lost during long-distance transmission from generators to consumers.
The Burden of Aging Infrastructure
Theft, Vandalism
Obsolete Layouts
Contribute to multi-billion dollar utility debts.
DECENTRALIZED GENERATION
SMART INFRASTRUCTURE AND RELIABILITY
Smart Meters & Two-Way Communication
Devices that record real-time consumption data to help utilities balance supply and demand.
The Rise of Microgrids
DISCONNECT
Localized grids that can disconnect and operate autonomously during regional outages.
Grid-Scale Energy Storage
(including pumped hydro, batteries, etc.)
Lithium-ion
Best Duration Use: Less than 4h
Highly mature for EVs and grid
Vanadium Flow
Best Duration Use: 4h to Days
Decoupled power and energy capacity
Iron-air
Best Duration Use: Weeks
Suitable for very long-term storage
NotebookLM

Powering Progress: The Lifecycle and Evolution of Electrical Grids

The Delivery Chain: From Plant to Plug



High-Voltage Transmission

Stepping up voltage for long-distance travel reduces energy loss caused by wire resistance.

Step-Down Substations

Transformers lower voltage levels at local hubs to safely enter residential and industrial areas.

Small vs. Large Power Users (SPU/LPU)

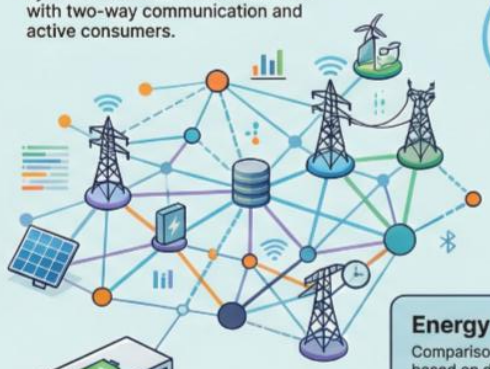
Small users (households) operate under 56 kVA

while larger industrial users require higher-capacity connections.

Grid Resilience and Future Innovation

The Smart Grid Evolution

Transitioning from centralized, passive systems to decentralized networks with two-way communication and active consumers.



Intelligent Metering (AMI)

Smart meters allow remote monitoring, power outage notification, and real-time coosumption data for users.

Black Start Restoration

Specialized generators or batteries bootstrap the grid back into operation after a total blackout.

Energy Storage Technologies

Comparison of Energy Storage Technologies based on discharge duration

Lithium-ion	< 4h to 8h — Short-term grid stability
Vanadium Flow	4h to Days — Medium-duration load shifting
Iron-air	Days to Weeks — Long-term seasonal backup

NotebookLM

The Grid Evolution: From Centralized Power to Smart Networks

THE TRADITIONAL CENTRALIZED MODEL

Centralized Generation & One-Way Flow

Power moves from distant large plants through high-voltage transmission to passive end-users.

Aging Infrastructure Vulnerabilities

Older equipment and obsolete layouts increase the risk of cascading failures and blackouts.

Baseload vs. Peaking Plants

Massive coal or nuclear plants provide constant power, while expensive "peakers" handle surges.

THE SMART DECENTRALIZED FUTURE

Distributed Renewable Production

Many small producers (solar/wind) generate power closer to the point of consumption.

Two-Way Smart Communication

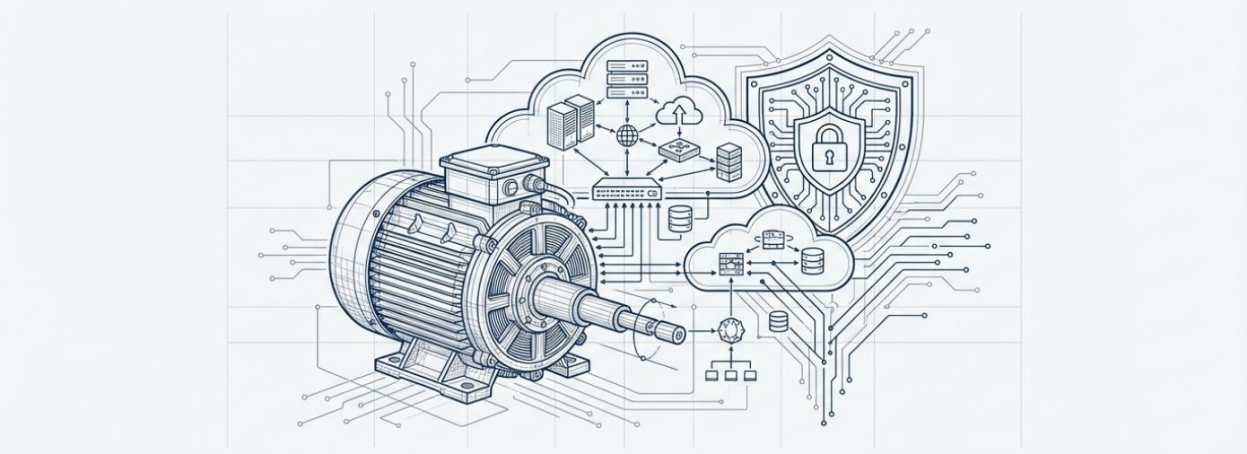
Smart meters enable real-time data exchange between suppliers and consumers for better efficiency.

Microgrids & Energy Islanding

Localized grids can disconnect from the main network to operate autonomously during outages.

Energy Storage Technologies

NotebookLM



Integrated Engineering & Technology Frameworks

A Multidisciplinary Portfolio: Bridging Electrical Engineering, Cloud Architecture, and Security Governance

Tshingombe Fiston (Tshingombe Tshitadi)

Electrical & Mechanical Engineering | Microsoft Azure & Cloud Solutions | Security Architecture & Compliance | Pedagogical Framework Development

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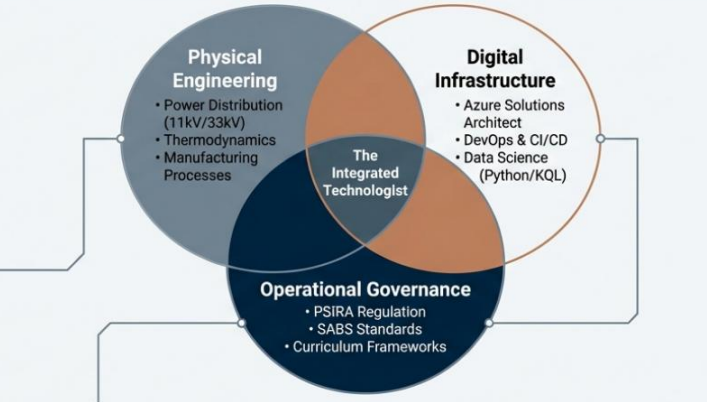
The Integrated Competency Profile

A comprehensive portfolio demonstrating the convergence of industrial trade theory, advanced digital infrastructure, and regulatory compliance.

Focused on solving systemic backlogs and irregularities in technical education and industrial application through a unique T-shaped skill set.



Microsoft Certified: Azure Solutions Architect

NQF Level Monitoring Authority

PSIRA Registered Security Provider

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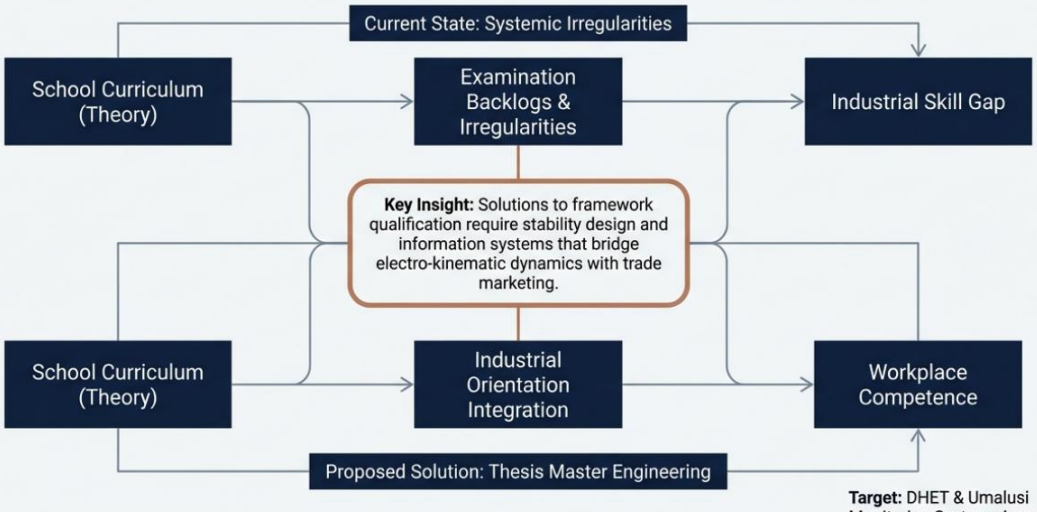
The Central Thesis: Bridging the Theory-Practice Gap


Current State: Systemic Irregularities
School Curriculum (Theory)
Examination Backlogs & Irregularities
Industrial Skill Gap
Key Insight: Solutions to framework qualification require stability design and information systems that bridge electro-kinematic dynamics with trade marketing.
School Curriculum (Theory)
Industrial Orientation Integration
Workplace Competence
Proposed Solution: Thesis Master Engineering

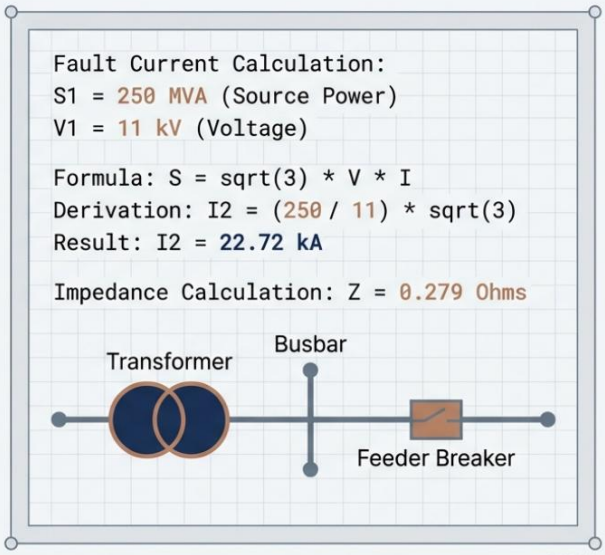
Target: DHET & Umalusi Monitoring Systems improvement.

NotebookLM

Pillar 1: Electrical Engineering & Power Systems

Substation & Fault Analysis

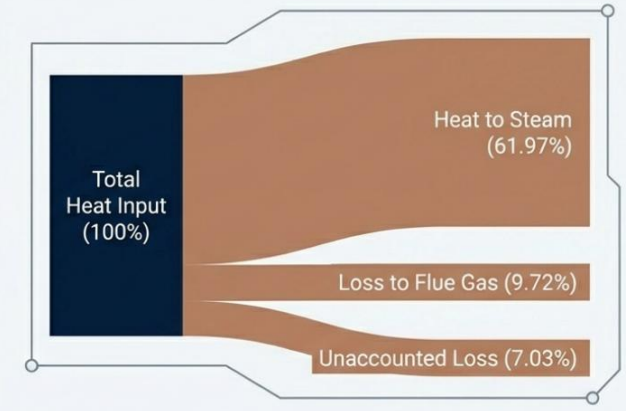
- Substation Design (33kV / 11kV)
- Fault Level Calculation on 11kV Feeders
- PV & Renewable Installation Guidelines
- DC Motor Speed Control (PWM & H-Bridge)

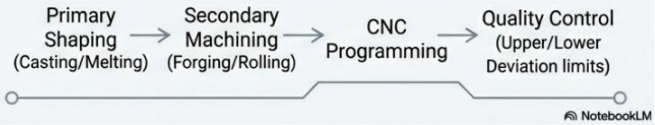

Fault Current Calculation:
S1 = 250 MVA (Source Power)
V1 = 11 kV (Voltage)
Formula: S = sqrt(3) * V * I
Derivation: I2 = (250 / 11) * sqrt(3)
Result: I2 = 22.72 kA
Impedance Calculation: Z = 0.279 Ohms
Transformer
Busbar
Feeder Breaker

NotebookLM

Mechanical Systems & Manufacturing Processes

Automotive Performance Specs (VW/Internal Combustion)	
Bore / Stroke	81mm / 91.5mm
Compression Ratio	16.5:1
Max Torque	400nm @ 1500rpm
Thermal Efficiency	(Work Done / Heat Supplied) x 100





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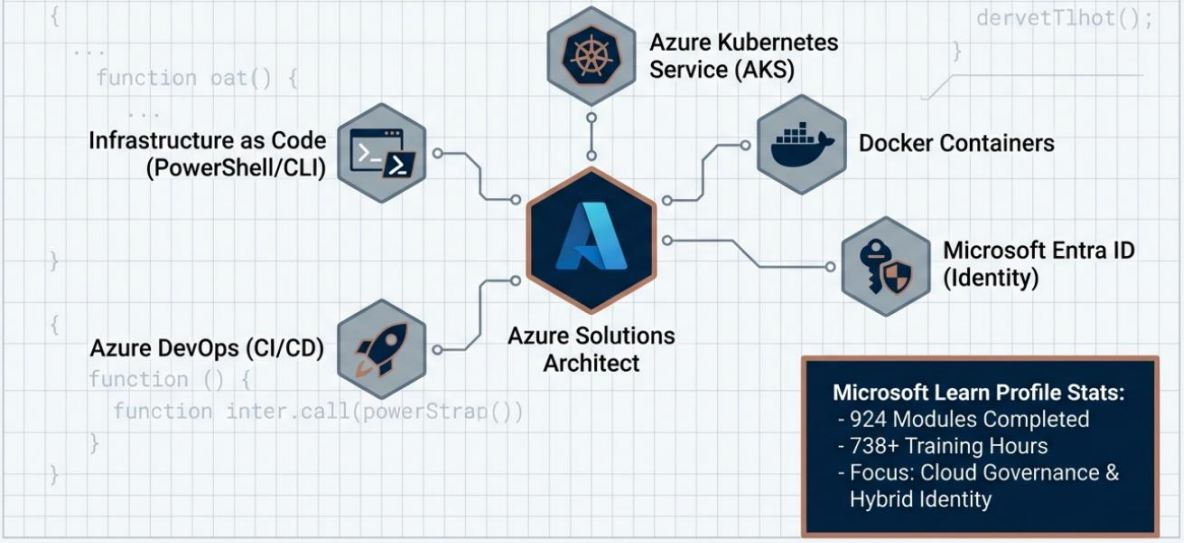
Pillar 2: Digital Infrastructure & Cloud Architecture



NotebookLM

Applied Data Science & Artificial Intelligence

```
// Kusto Query Language (KQL) Log Analysis
T | summarize count() by bin(timestamp, 1h)
| where SeverityLevel == 'Error'
| render timechart

# Python / Data Science
import pandas as pd
import torch
model = AzureOpenAI(deployment='gpt-4')
```

AI & Data Competencies

- **Generative AI**: Prompt Engineering & RAG Implementation
- **Computer Vision:** Image Classification (PyTorch/Custom Vision)
- **NLP**: Sentiment Analysis & Language Understanding
- **Data Viz**: Power BI & Azure Synapse Analytics

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Pillar 3: Security Governance & Regulatory Frameworks

Statutory Knowledge

Private Security Industry Regulation Act 56 of 2001.

Management of Section 23(6) Exemptions and Appeals.

ISO and SABS Standards Compliance.

Physical Security Systems

Intrusion Detection Systems (IDS), PIR Sensors, and CCTV Access Control.

Design of microcontroller-based mains monitoring systems.

International Context

Engagement with UK Metropolitan Police recruitment standards.

Counter-terrorism and Intelligence Management protocols.

Bridging Legal Compliance with Technical Implementation.

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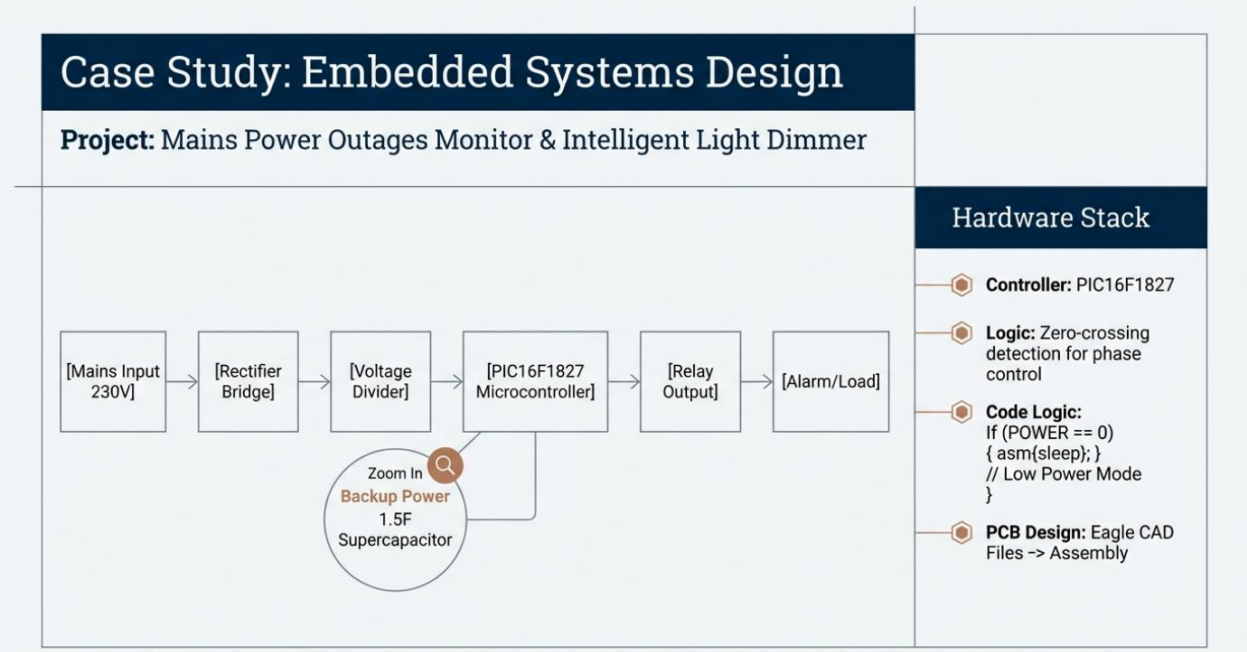
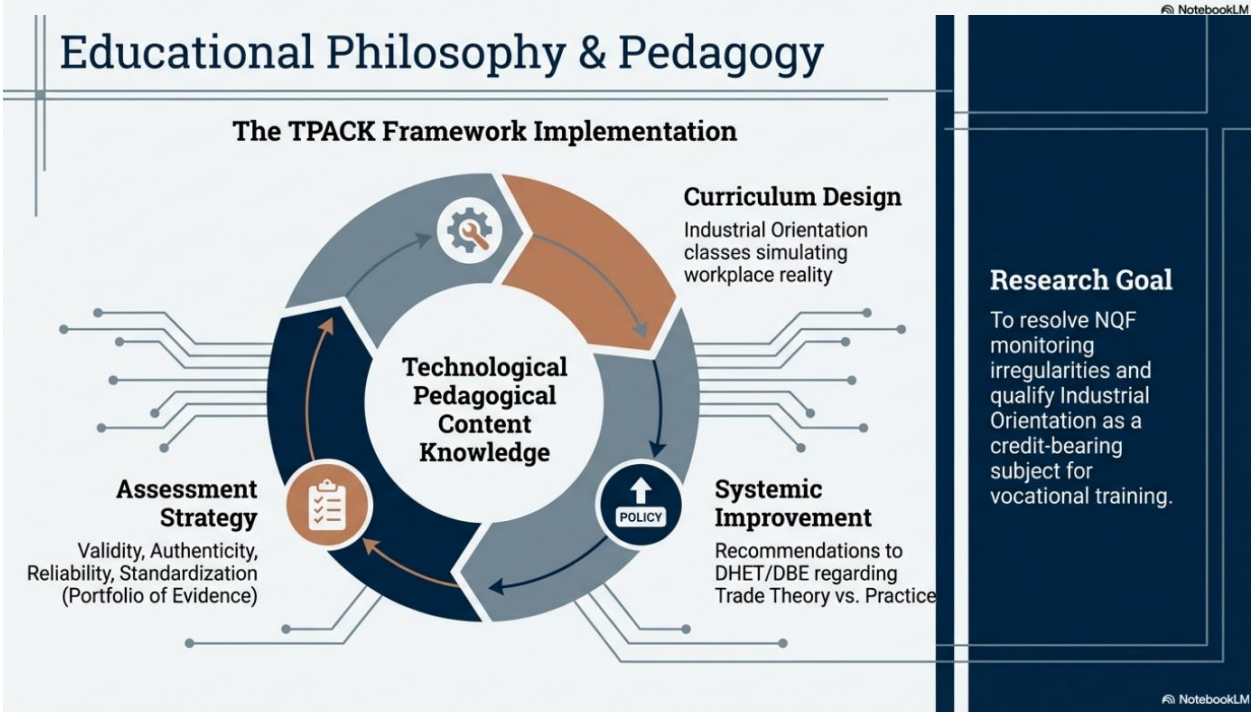

Case Study: Embedded Systems Design
Project: Mains Power Outages Monitor & Intelligent Light Dimmer
[Mains Input 230V]
[Rectifier Bridge]
[Voltage Divider]
[PIC16F1827 Microcontroller]
[Relay Output]
[Alarm/Load]
Zoom In
Backup Power
1.5F Supercapacitor
Hardware Stack
Controller: PIC16F1827
Logic: Zero-crossing detection for phase control
Code Logic:
If (POWER == 0)
{ asm{sleep}; }
// Low Power Mode
}
PCB Design: Eagle CAD Files -> Assembly


NotebookLM
Educational Philosophy & Pedagogy
The TPACK Framework Implementation
Curriculum Design
Industrial Orientation classes simulating workplace reality
Technological Pedagogical Content Knowledge
Assessment Strategy
Validity, Authenticity, Reliability, Standardization (Portfolio of Evidence)
POLICY
Systemic Improvement
Recommendations to DHET/DBE regarding Trade Theory vs. Practice
Research Goal
To resolve NQF monitoring irregularities and qualify Industrial Orientation as a credit-bearing subject for vocational training.
NotebookLM

Administrative Advocacy & Process Management

Problem → Solution

The Challenge

Managing irregularities in National Certificate exams and DHET backlogs. Complex appeals under PSIRA Act.

The Strategy

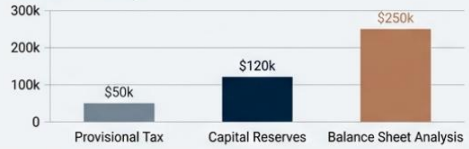
Drafting precise legal applications for exemption (Section 23(6)). Liaising with Umalusi for certification issuance.

The Outcome

Resolution of complaints, clearance of backlogs, and establishment of valid Portfolio of Evidence (PoE) systems.

Financial Competency

Resource Management



NotebookLM

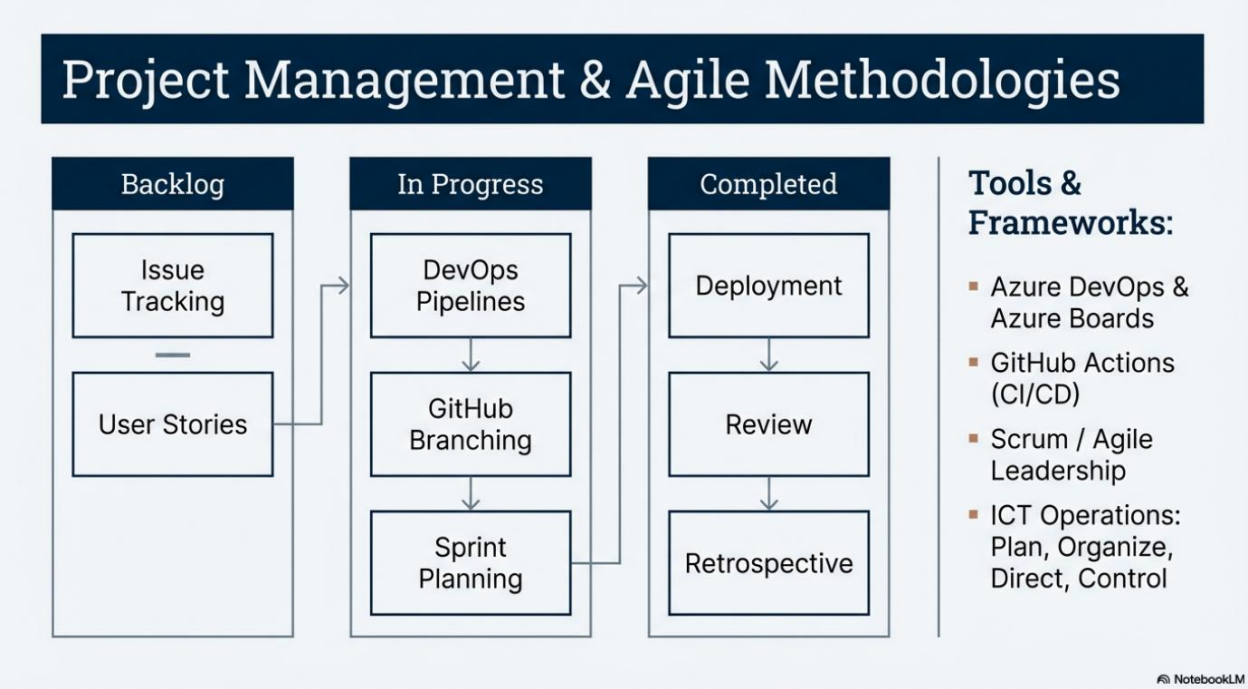
Applied Research: The 'Experimental' Job Experience

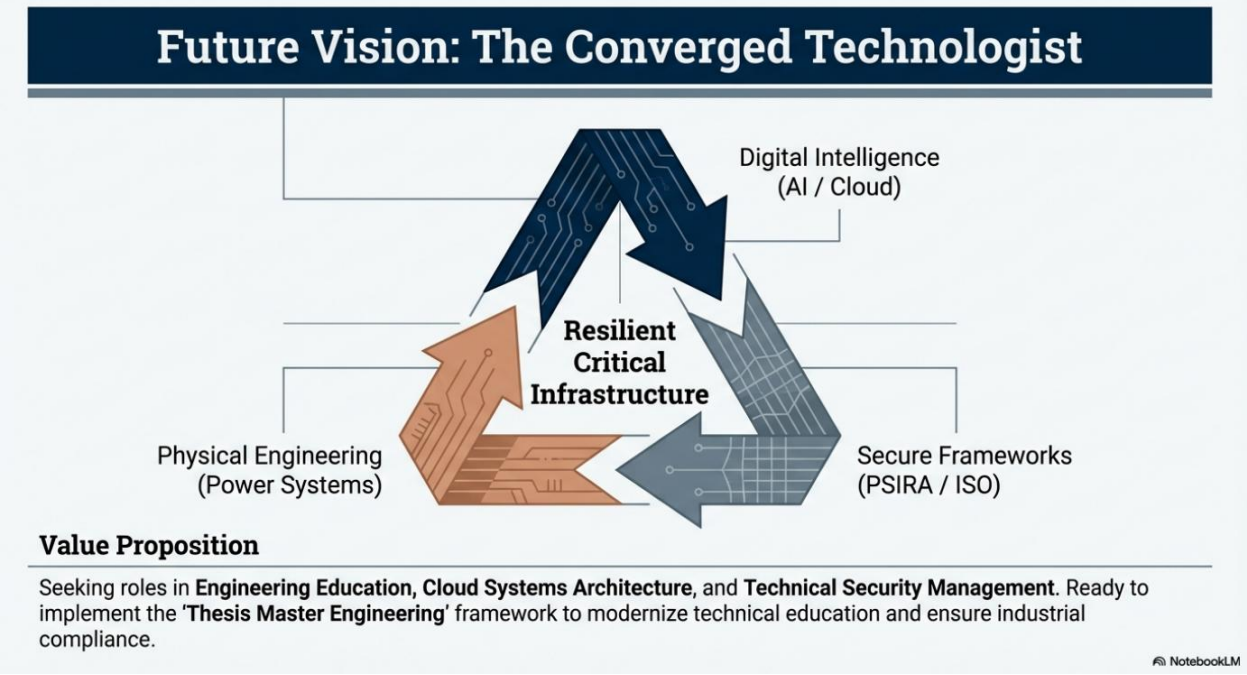
	Academic Input	Industrial Output
1	School Curriculum	Trade Marketing Needs
2	Theoretical Electro-Kinematics	Stability Design & Information Systems
3	Standard Examination	Experimental Workplace Practice

Thesis Proposal: "Thesis Master Engineering"

A framework proposing that stability design and information systems must bridge the gap between electro-kinematic dynamics and trade marketing realities. Advocating for "Industrial Orientation" as a recognized qualification subject.

NotebookLM


Project Management & Agile Methodologies
Backlog
Issue Tracking
User Stories
In Progress
DevOps Pipelines
GitHub Branching
Sprint Planning
Completed
Deployment
Review
Retrospective
Tools & Frameworks:
Azure DevOps & Azure Boards
GitHub Actions (CI/CD)
Scrum / Agile Leadership
ICT Operations: Plan, Organize, Direct, Control
NotebookLM


Future Vision: The Converged Technologist
Digital Intelligence (AI / Cloud)
Resilient Critical Infrastructure
Physical Engineering (Power Systems)
Secure Frameworks (PSIRA / ISO)
Value Proposition
Seeking roles in Engineering Education, Cloud Systems Architecture, and Technical Security Management. Ready to implement the 'Thesis Master Engineering' framework to modernize technical education and ensure industrial compliance.
NotebookLM

Tshingombe Fiston (Tshitadi)

Innovator in Engineering Education & Secure Infrastructure

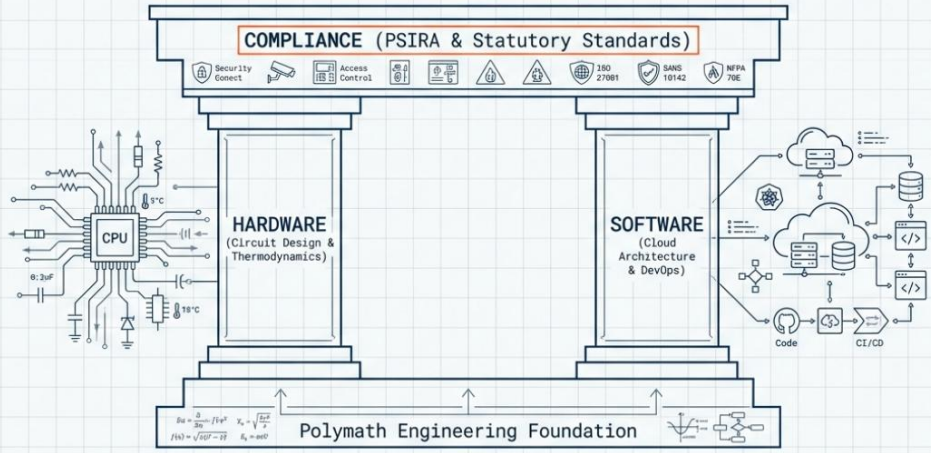
Email: tshingombefiston@gmail.com
Phone: +27 72 529 8946
Location: Johannesburg, South Africa

GitHub: github.com/kananga5
Salesforce Trailhead: Ranger Rank (22,125 Points)
Microsoft Learn: 900+ Modules Completed

NotebookLM

Engineering Competency & Technical Portfolio

Bridging Electrical Systems, ICT Infrastructure, and Security Frameworks



Presenter: Tshingombe Fiston (Tshitadi)

Context: Professional Capstone & Thesis Defense

NotebookLM

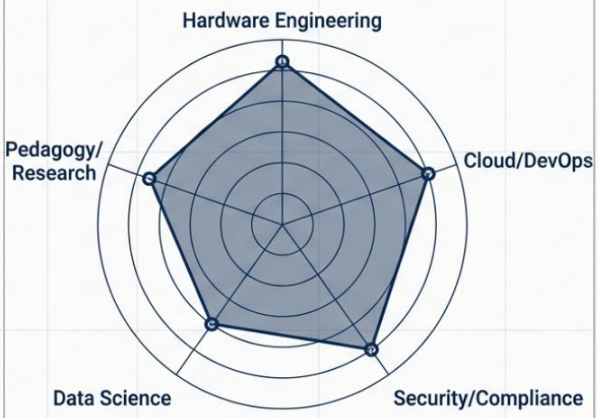
The Pollymath Profile: Multidisciplinary Skill Matrix

Core Competencies:

- **Electrical & Mechanical:** Expertise in motor control, boiler thermodynamics (Qin/Qout), and circuit fabrication.
- **Digital Transformation:** 700+ hours of verified Microsoft training (Azure, AI, Data Science).
- **Regulatory Rigor:** Adherence to PSIRA Act 56 of 2001 and SABS/IEC 62368-1 standards.

924 Modules Completed

Across Engineering and IT Disciplines



NotebookLM

Engineering Grounded in Statutory Compliance

Security Regulation

PSIRA Act 56 of 2001

Section 23: Service Provider Registration

Code of Conduct: Complaint management & quality assurance.

Educational Standards

NQF & SAQA Alignment

Levels 5–7 Framework

Umalusi Monitoring (Gen/Further Education Act 58 of 2001).

Technical Quality

SABS & IEC Standards

IEC 62368-1:2023: Safety of Audio/Video & ICT Equipment.

ISO Standards for Quality Management.

Operational philosophy defined by strict adherence to South African legal and safety framewo

NotebookLM

Domain I: Electrical Engineering Theory & Circuit Design

Electrical Engineering Theory

$$P = VI\sqrt{3}$$

Three-Phase Power

$$e^{j\theta} = \cos\theta + j\sin\theta$$

Euler's Relation for Impedance

$$I = I_A \cdot \cos\phi$$

Power Factor Correction

Machine Theory

Analysis of AC/DC machines, transmission lines, and rectified transmission systems.

Design Methodology

Schematic Design → Testability Checklist → PCB Layout Optimization → Flow Manufacture Process

Lighting tubes & Photovoltaic guidelines.

NotebookLM

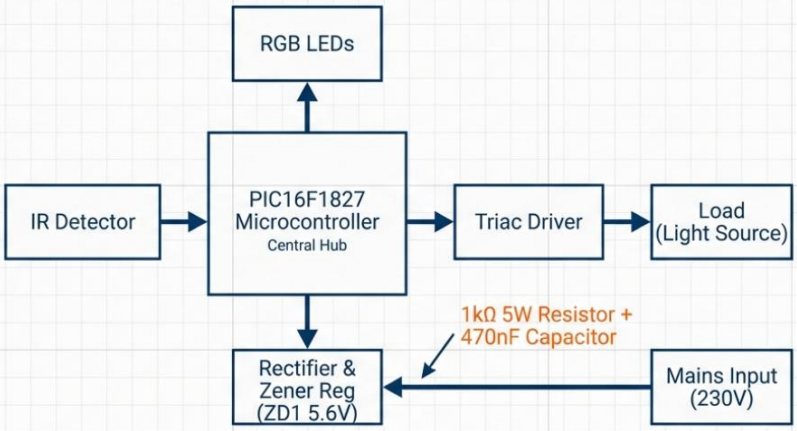
Project Showcase: Intelligent Dimmer Module

Microcontroller: PIC16F1827 (8-bit)

Function: Remote-controlled dimming with visual feedback.

Power Logic: Mains derived via current limiting impedance.

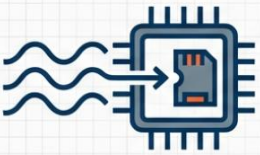
Components: Zener diode regulation, Triac switching, IR Interface.



NotebookLM

Interfacing the Physical World: Robotics & Environmental Logging

Weather Logger Project



Sensors: Humidity transducers (Freq output 6kHz–7kHz).

Processing: ATmega microcontroller with 16-bit counter/timer.

Storage: 64KB Data Logging capacity.

Robot Electronics & Navigation

Navigation: Compass modules (CMPS) & Keypad Matrix (4x4 scanning).

Interface: FT232R USB-to-Serial conversion.

Firmware: Custom C/C++ driver development.

Bridging analog sensor data with digital logic control systems.

NotebookLM

Domain II: Mechanical Systems & Thermodynamics

Thermodynamic Efficiency

$$Q_{econ} = \frac{m_s(h_2 - h_1)}{m_f}$$

Steam Table Analysis (h_f, h_{fg}) & Heat Transfer (Q_{in} vs Q_{out})

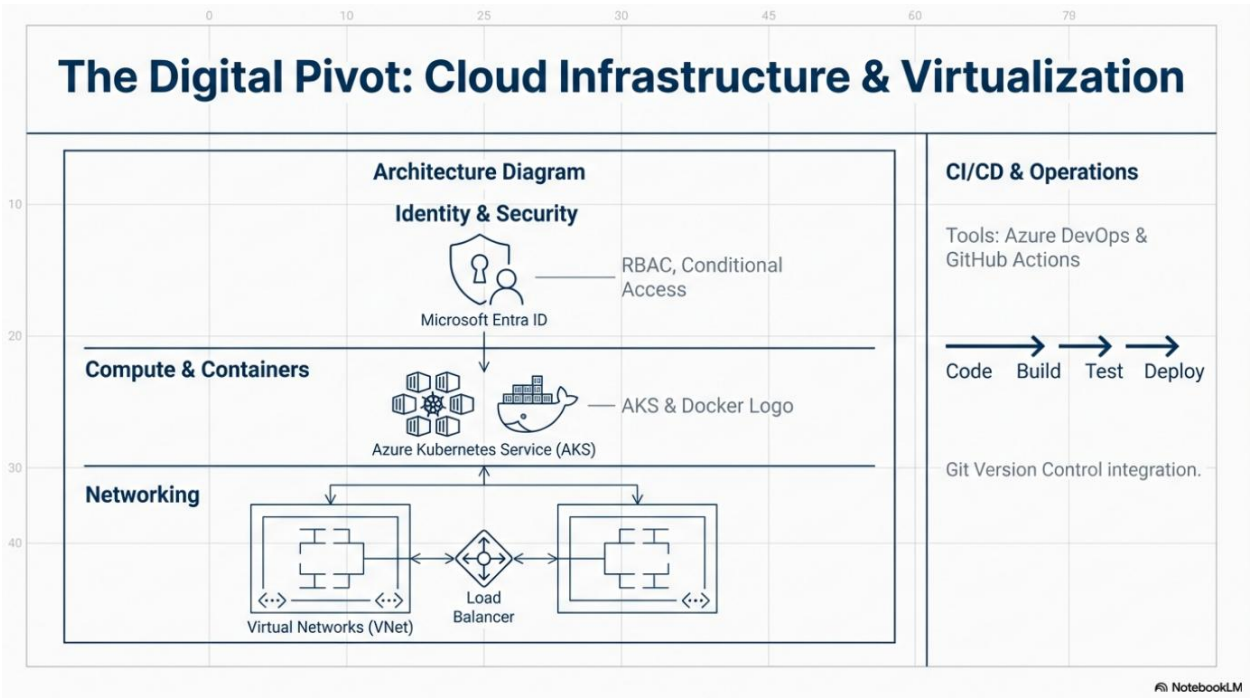
Mechanics & Hydraulics

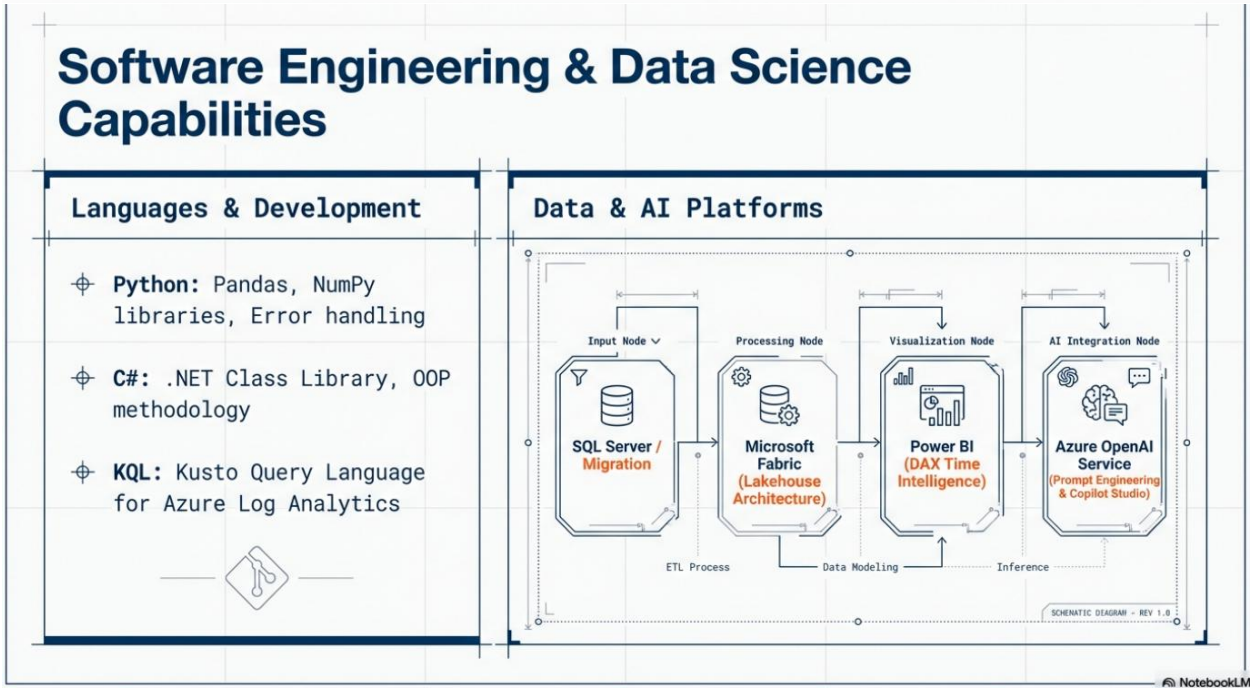
Stress/Strain Analysis: Young's Modulus ($E = \sigma/\varepsilon$) **Fluid Power:** Pneumatics & Hydraulics ($P = F/A$)

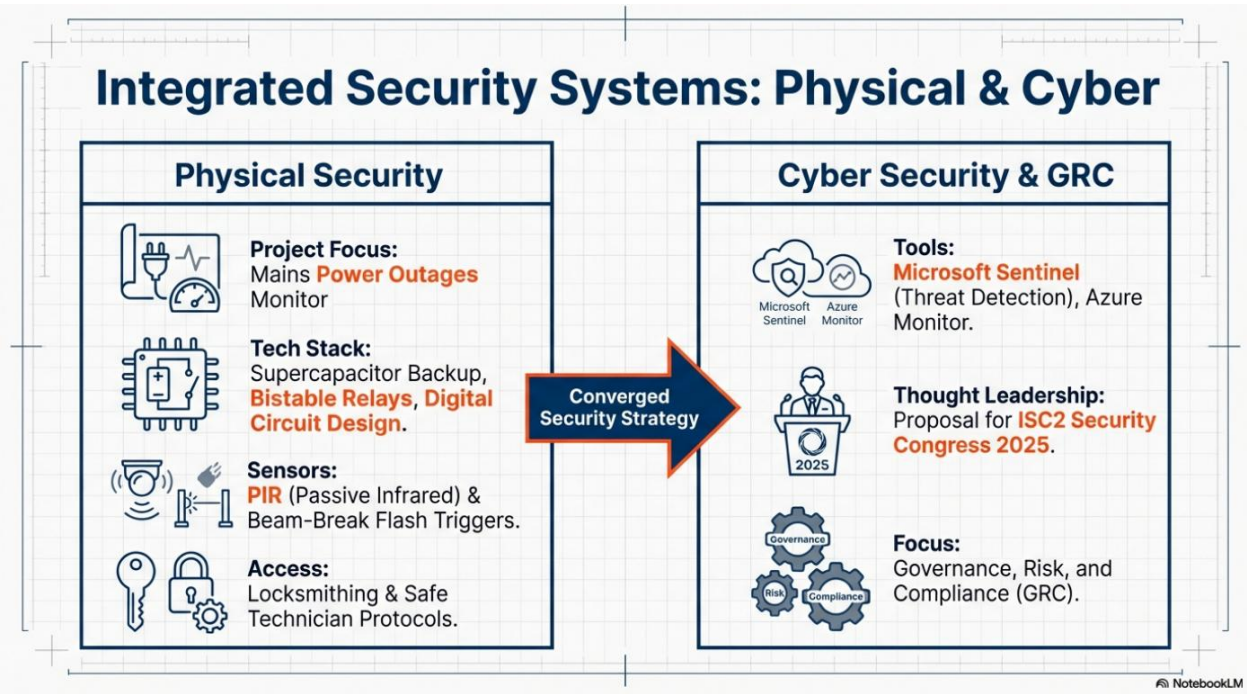
Automotive Performance Data

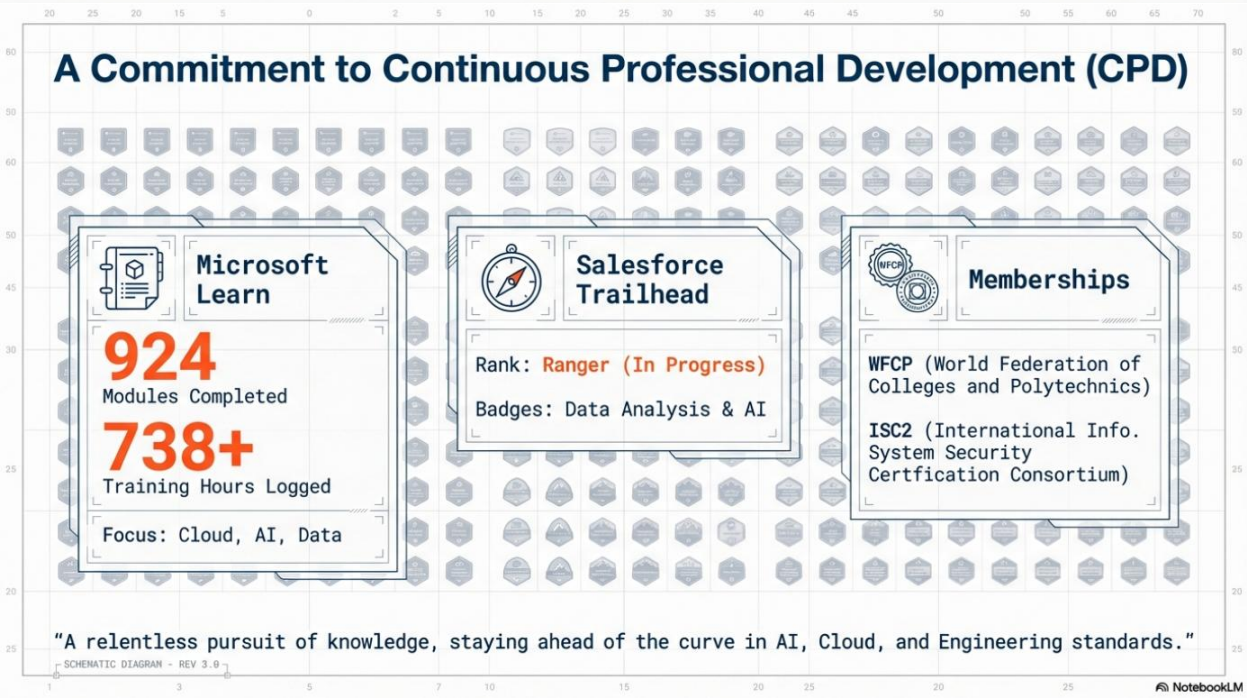
Metric	VW Amarok (BiTDI)	Subaru Engine
Max Torque	400Nm @ 1500rpm	329Nm @ 4000rpm
Compression Ratio	16.5:1	10.0:1
Displacement	1968 cc	2457 cc

NotebookLM


The Digital Pivot: Cloud Infrastructure & Virtualization
Architecture Diagram
Identity & Security
Microsoft Entra ID
RBAC, Conditional Access
Compute & Containers
Azure Kubernetes Service (AKS)
AKS & Docker Logo
Networking
Virtual Networks (VNet)
Load Balancer
CI/CD & Operations
Tools: Azure DevOps & GitHub Actions
Code
Build
Test
Deploy
Git Version Control integration.
NotebookLM


Software Engineering & Data Science Capabilities
Languages & Development
Python: Pandas, NumPy libraries, Error handling
C#: .NET Class Library, OOP methodology
KQL: Kusto Query Language for Azure Log Analytics
Data & AI Platforms
Input Node
Processing Node
Visualization Node
AI Integration Node
SQL Server / Migration
Microsoft Fabric (Lakehouse Architecture)
Power BI (DAX Time Intelligence)
Azure OpenAI Service (Prompt Engineering & Copilot Studio)
ETL Process
Data Modeling
Inference
SCHEMATIC DIAGRAM - REV 1.0
NotebookLM


Integrated Security Systems: Physical & Cyber
Physical Security
Project Focus:
Mains Power Outages
Monitor
Tech Stack:
Supercapacitor Backup,
Bistable Relays, Digital
Circuit Design.
Sensors:
PIR (Passive Infrared) &
Beam-Break Flash Triggers.
Access:
Locksmithing & Safe
Technician Protocols.
Converged
Security Strategy
Cyber Security & GRC
Microsoft Sentinel
Azure Monitor
Tools:
Microsoft Sentinel
(Threat Detection), Azure
Monitor.
2025
Thought Leadership:
Proposal for ISC2 Security
Congress 2025.
Governance
Risk
Compliance
Focus:
Governance, Risk, and
Compliance (GRC).
NotebookLM


A Commitment to Continuous Professional Development (CPD)
Microsoft Learn
924
Modules Completed
738+
Training Hours Logged
Focus: Cloud, AI, Data
Salesforce Trailhead
Rank: Ranger (In Progress)
Badges: Data Analysis & AI
WFCP
Memberships
WFCP (World Federation of Colleges and Polytechnics)
ISC2 (International Info. System Security Certfication Consortium)
"A relentless pursuit of knowledge, staying ahead of the curve in AI, Cloud, and Engineering standards."
SCHEMATIC DIAGRAM - REV 3.0
NotebookLM

Applied Research & Engineering Pedagogy

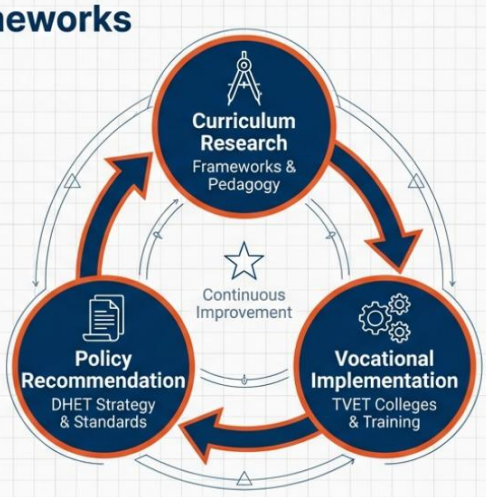
Academic Thesis & Curriculum Frameworks

Thesis Topic: **Master Engineering Thesis**: Curriculum Frameworks for **Electrical Engineering**.

TVET Focus: Enhancing '**Orientation Industrial**' trade theory in vocational colleges.

Methodology: Data collection via Teacher/HOD feedback; Recommendations to **DHET** (Dept of Higher Education).

Instructional Design: 21st Century Learning Design (**21CLD**) – Integrating tech into vocational training.



"Driving innovation in engineering education through rigorous research and practical application."

SCHEMATIC DIAGRAM – REV 4.0

NotebookLM

Industry Readiness & Target Career Tracks

Technology (Microsoft)
- **Software Engineer II**
- **Technical Specialist**

Automotive (Ford)
- **Propulsion Systems Engineer**
- **HV Battery Test Engineer**

Utility & Power (Eskom)
- **Power Generation Engineer**
- **Technical Official**

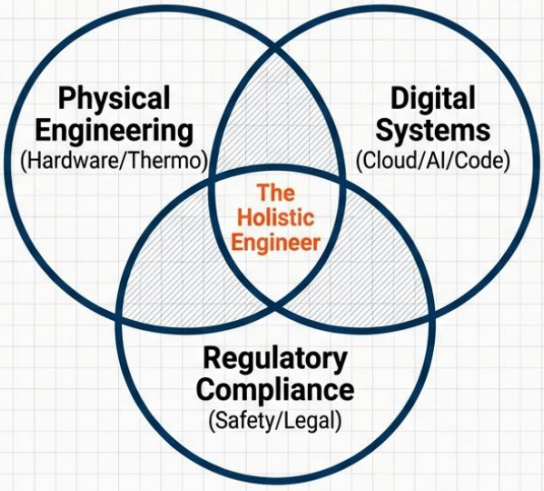
Public Safety (Met Police)
- **Forensic/Intelligence Analyst**
- **Intelligence Manager**

"Ready to deploy in high-stakes environments requiring clearance, technical rigor, and operational safety."

SCHEMATIC DIAGRAM – REV 6.0

NotebookLM

The Polymath Value Proposition



- **Debugs the circuit board AND** the cloud code.
- Wields the soldering iron **AND** solves differential equations.
- Builds systems secure by design (PSIRA & SABS).

"Seeing the entire system—from the boiler room to the boardroom dashboard."

SCHEMATIC DIAGRAN - REV 6.0

NotebookLM

Connect & Collaborate

Tshingombe Fiston (Tshitadi)

Engineering | IT Infrastructure | Security Management

GitHub: kananga5
(Repositories: Engineering databases)

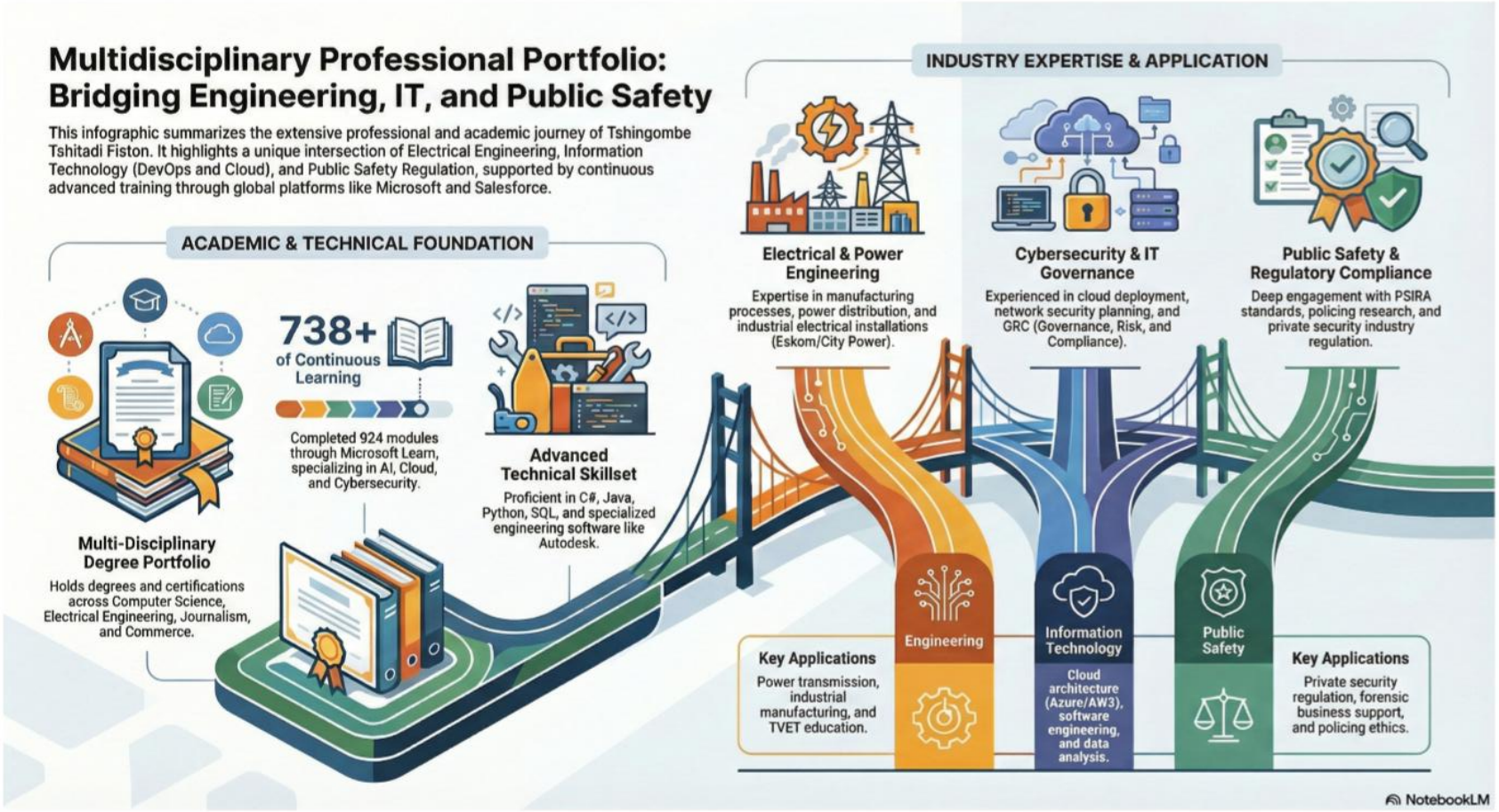
Azure DevOps:
dev.azure.com/
tshingombefiston0091

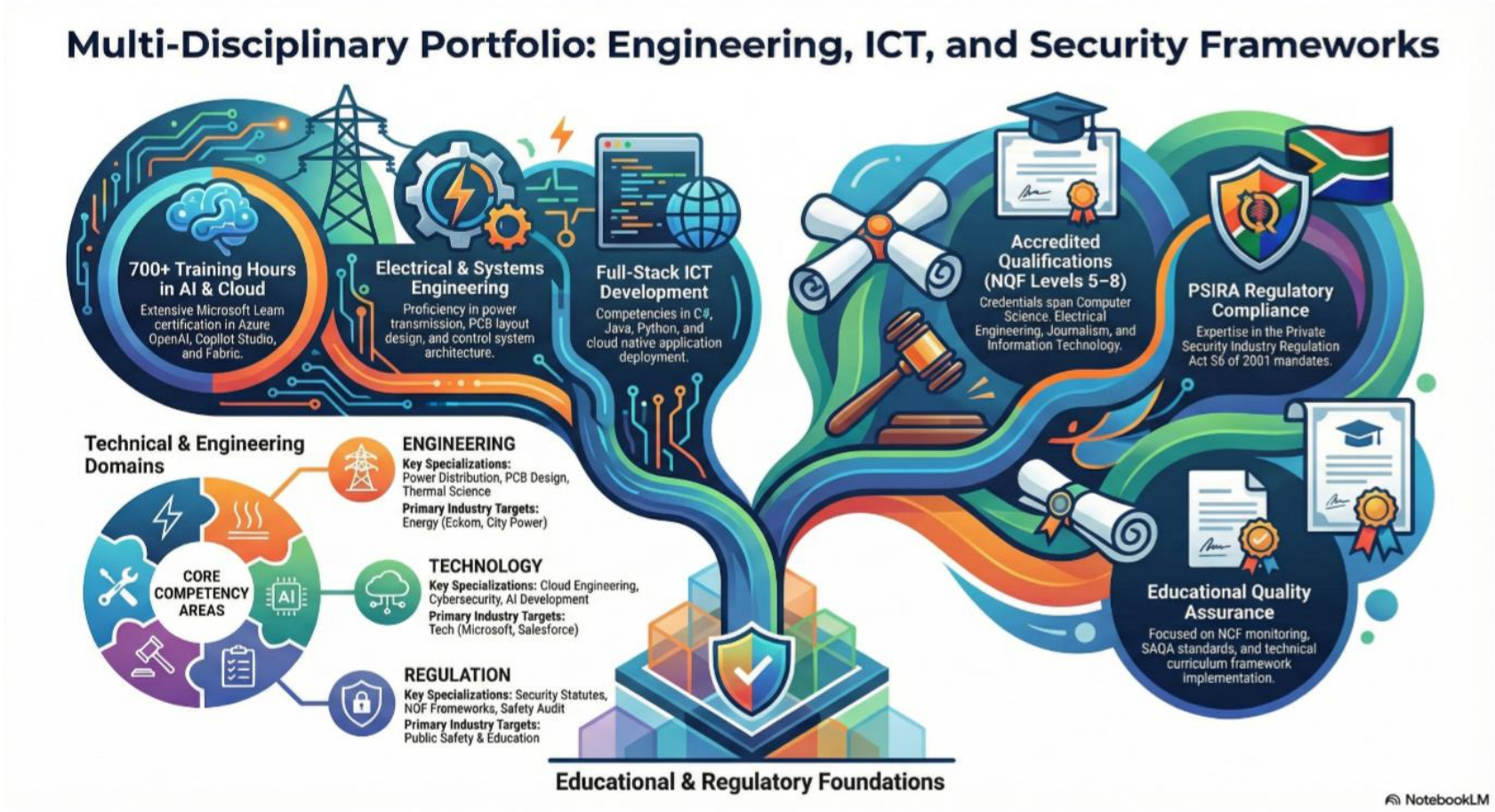
Salesforce Trailhead:
Trailblazer Profile

Available for opportunities in Software Engineering, Technical Management, and Industrial Systems.

SCHEMATIC DIAGRAN - REV 6.0

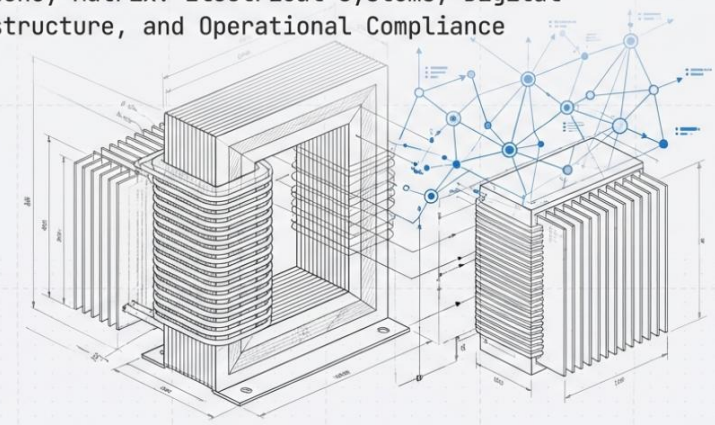
NotebookLM


Multidisciplinary Professional Portfolio: Bridging Engineering, IT, and Public Safety
This infographic summarizes the extensive professional and academic journey of Tshingombe Tshitadi Fiston. It highlights a unique intersection of Electrical Engineering, Information Technology (DevOps and Cloud), and Public Safety Regulation, supported by continuous advanced training through global platforms like Microsoft and Salesforce.
ACADEMIC & TECHNICAL FOUNDATION
Multi-Disciplinary Degree Portfolio
Holds degrees and certifications across Computer Science, Electrical Engineering, Journalism, and Commerce.
738+
of Continuous Learning
Completed 924 modules through Microsoft Learn, specializing in AI, Cloud, and Cybersecurity.
Advanced Technical Skillset
Proficient in C#, Java, Python, SQL, and specialized engineering software like Autodesk.
INDUSTRY EXPERTISE & APPLICATION
Electrical & Power Engineering
Expertise in manufacturing processes, power distribution, and industrial electrical installations (Eskom/City Power).
Cybersecurity & IT Governance
Experienced in cloud deployment, network security planning, and GRC (Governance, Risk, and Compliance).
Public Safety & Regulatory Compliance
Deep engagement with PSIRA standards, policing research, and private security industry regulation.
Engineering
Information Technology
Public Safety
Key Applications
Power transmission, industrial manufacturing, and TVET education.
Cloud architecture (Azure/AW3), software engineering, and data analysis.
Key Applications
Private security regulation, forensic business support, and policing ethics.
NotebookLM


Multi-Disciplinary Portfolio: Engineering, ICT, and Security Frameworks
700+ Training Hours in AI & Cloud
Extensive Microsoft Learn certification in Azure OpenAI, Copilot Studio, and Fabric.
Electrical & Systems Engineering
Proficiency in power transmission, PCB layout design, and control system architecture.
Full-Stack ICT Development
Competencies in C#, Java, Python, and cloud native application deployment.
Accredited Qualifications (NQF Levels 5–8)
Credentials span Computer Science, Electrical Engineering, Journalism, and Information Technology.
PSIRA Regulatory Compliance
Expertise in the Private Security Industry Regulation Act 56 of 2001 mandates.
Technical & Engineering Domains
CORE COMPETENCY AREAS
AI
ENGINEERING
Key Specializations: Power Distribution, PCB Design, Thermal Science
Primary Industry Targets: Energy (Eckom, City Power)
TECHNOLOGY
Key Specializations: Cloud Engineering, Cybersecurity, AI Development
Primary Industry Targets: Tech (Microsoft, Salesforce)
REGULATION
Key Specializations: Security Statutes, NQF Frameworks, Safety Audit
Primary Industry Targets: Public Safety & Education
Educational Quality Assurance
Focused on NCF monitoring, SAQA standards, and technical curriculum framework implementation.
Educational & Regulatory Foundations
NotebookLM

Professional Engineering & ICT Portfolio

Competency Matrix: Electrical Systems, Digital Infrastructure, and Operational Compliance



SPEC SHEET

Helvetica Now Display Medium in Draftsman Navy

Presenter

Tshingombe Fiston (Tshingombe Tshitadi)

Affiliation

St Peace College & Institute | Academic Students Brigade

Department

Engineering Dept.

Vendor Status

CSD Registered

Location

Johannesburg / Pretoria

NotebookLM

Integrated Technical & Operational Capabilities.

A versatile engineering professional bridging the gap between high-voltage power systems, ICT security, and organizational leadership. Proven capability in rigorous academic environments (St Peace College) and practical industrial application (Jacobs Engineering experience).

Electrical Engineering

- N-Level Studies (N4-N6)
- Power Systems Analysis
- Motor Control
- Panel Wiring Certification

ICT & Security

- Network Architecture
- Azure DevOps
- Automation Testing (Selenium)
- Manager ICT Security Roles

Leadership & Governance

- Academic Brigade Command Structure
- Disciplinary Oversight
- Personnel Management
- CSD Registration (National Treasury)

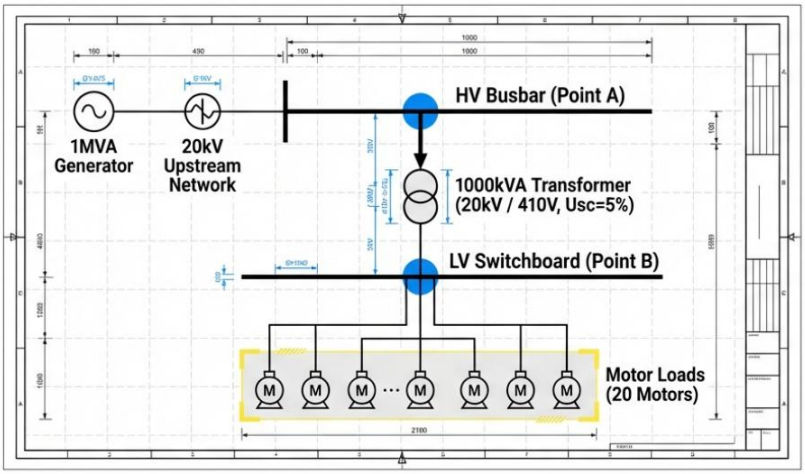
VERIFIED CREDENTIAL

Employer	Job title	Start date	End date	Description
St Peace College	Manager ICT Security, Academcle Brigade Command	01/01/2013	12/31/2025	Manager of Academic Brigade Command Structors. Disciplinary Oversight and Personnel Ranageaent. Rationel Treasory CSD Registration.
Fanel Wiring	Fanel Wiring Certification	01/01/2015	12/31/2016	Coapleted Panel airing certificeten. B4-B6 Engineering stodies.

NotebookLM

High-Voltage Network Analysis & Distribution

Case Study: 20kV Network Impedance & Short Circuit Calculation



Network Impedance Data

- Upstream Impedance (Z_{up}):
  - X_{up} = 9.97 Ohms
  - R_{up} = 0.15 Ohms
- Transformer Impedance (Z_t):
  - Calculated at LV side
- Fault Level Analysis:
  - Point A (HV Bus) vs. Point B (LV Bus)

NotebookLM

Rotating Machines & Dynamic Motor Control

10HP Induction Motor

Helvetica Now Display

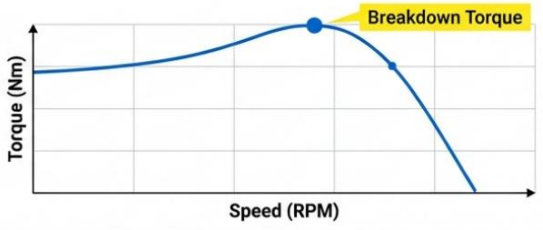
- Power: 746W/HP
- Torque: 64.7 N.m at 35.9A
- Equation: T = K * Flux * Ia

Moment of Inertia (J)

$$\int_0^{84} T_{\_acc}\, dt = J * \int_{84}^{0} dw$$

$$T_{\_acc} = J * \frac{dw}{dt}$$

Torque-Speed Curve



Drive Systems: VFD Parameters (Schneider Altivar / EcoStr

NotebookLM

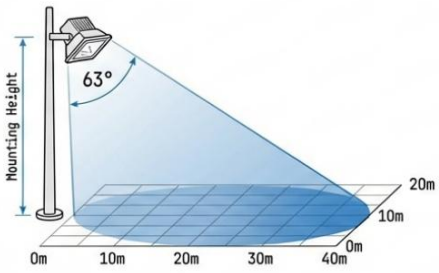
Illumination Engineering & Photometric Design

Specification Sheet: High Pressure Sodium Floodlight

Design Parameters:

- Lamp Type: High Pressure Sodium (400W)
- Mounting Height: 12m
- Area Dimensions: 20m x 40m
- Target Illumination: 16 Lux (Roadway Standard)

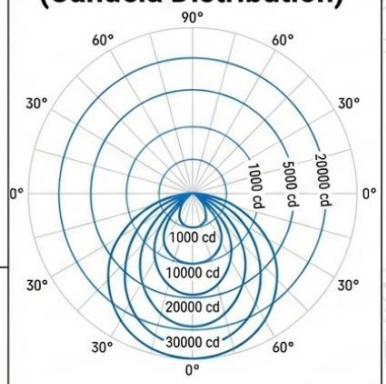
Floodlight Aiming Diagram



$$Lux = \frac{LL * CU * LLD}{Area}$$

Result: 22.7 lx (Average Illumination)

Iso-candela Curve (Candela Distribution)



Photometric Data Analysis & Layout Design

NotebookLM

Thermodynamics & Economic Plant Optimization

Cogeneration Plant Cycle

Helvetica Now Display

Efficiency Metrics

Heat Rate:	10,550 kJ/kWh
Annual Load Factor:	0.595

Economic Dispatch

Unit A Cost:	$17.55 / MWh
Unit C Cost:	$18.00 / MWh
Break-Even Condition:	Load Optimization

Income Statement

Revenue: 25,000

Net Income: 853

Photometric Data Analysis & Layout Design

NotebookLM

Industrial Precision meets Editorial Technicality

ICT Security Architecture & Digital Operations

Manager ICT Security / OT

- Firewall Configuration
- Risk Assessment
- Disaster Recovery Planning
- Azure DevOps Management

Automation Testing (Selenium)

```
import org.openqa.selenium.chrome.ChromeOptions;
import java.util.HashMap;

public class SeleniumTest {
    public static void main(St
        ChromeOptions brow
        browserOptions.se
        browserOptions.
        HashMap<String,
        ltOptions.put("
        ltOptions.put("
        ltOptions.put("
        ltOptions.put("
        ltOptions.put("w3c
        browserOptions.setCap
        // Add more Selenium code here
    }
}
```

Verified

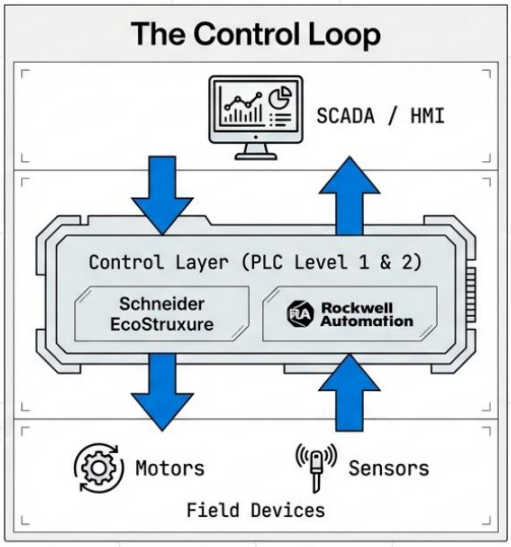
ICT Security & Digital Op NotebookLM

Industrial Automation & Control Systems

EcoStruxure
Control Expert

SKM Power Tools
(Load Flow Analysis)

Python / Java
Integration

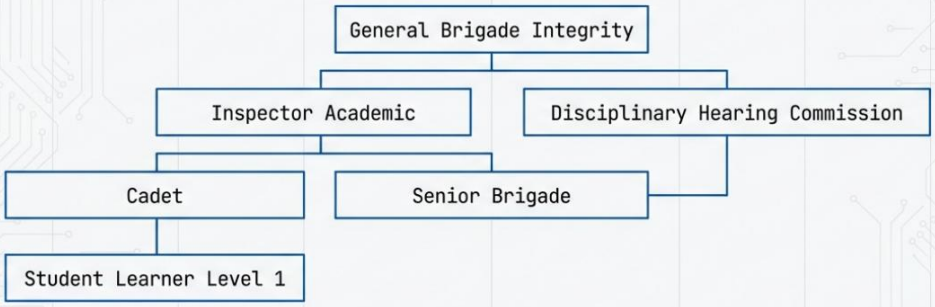


Start/Stop Logic:
Servo Control
Parameters

NotebookLM

Organizational Governance & Personnel Management

St Peace College: Academic Brigade Structure



Duty Roster

Shift	Role	Responsibility
Morning	Facilitator	Academic Oversight
Night	Guard Faculty	Occurrence Book Logging

NotebookLM

Incident Management & Operational Reporting

Incident Log Table

Incident #	Summary	Priority	Status	Category
1900050	CSD Registration Process	5	Resolved	Administrative
Fault Log	City Power Grid Fault	High	Logged	Engineering

NotebookLM

Commercial Compliance & Vendor Readiness.

Central Supplier Database (CSD)

Registered Vendor.
National Treasury Compliant.

Occupational Health & Safety

Safety 1 & Security Protocols.
OHS Act Adherence.

Financial Readiness

Tax Compliant.
Invoicing Systems (Xero).
Vendor Entity: Tshingombe Engineering.

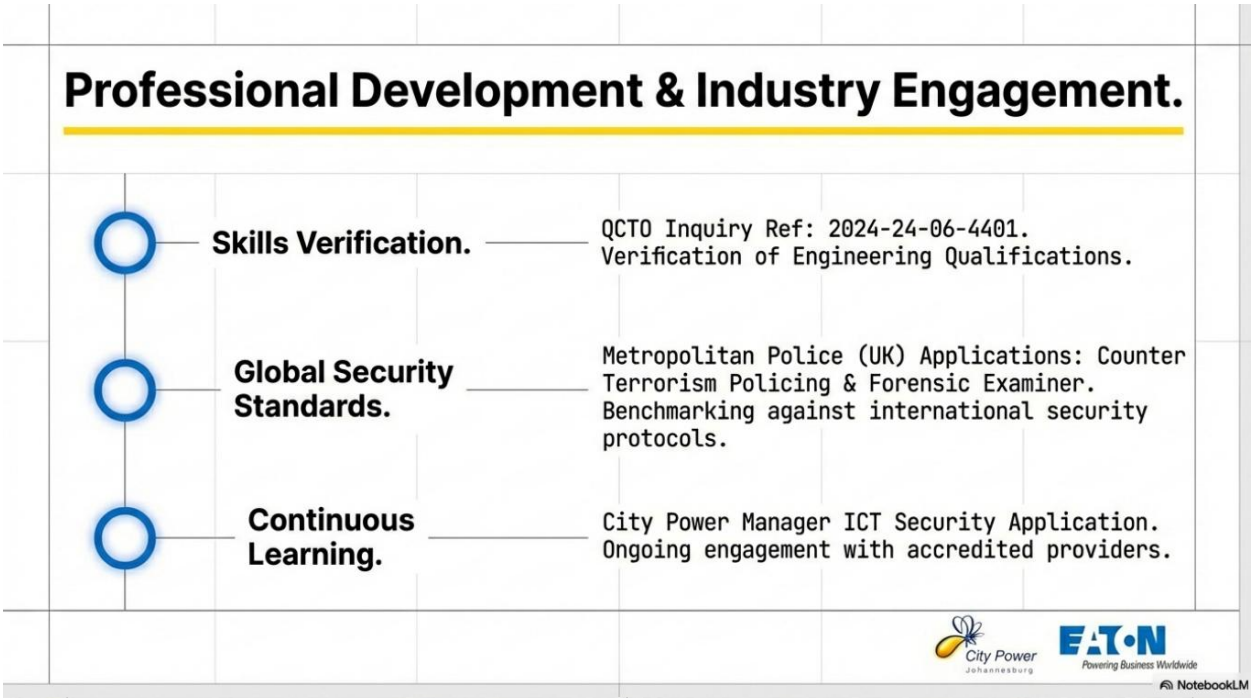
Applied Project Portfolio.

Hands-On Certification

Engineering Design

- **Jacobs Engineering:** Analysis & Investigation of Components.
- **Wiring Electrical Software:** Simulation & Testing.
- **Publication:** Education Technology & Fundamental Electrical Elements.

Powering Business Worldwide


Professional Development & Industry Engagement.
Skills Verification.
QCTO Inquiry Ref: 2024-24-06-4401.
Verification of Engineering Qualifications.
Global Security Standards.
Metropolitan Police (UK) Applications: Counter Terrorism Policing & Forensic Examiner.
Benchmarking against international security protocols.
Continuous Learning.
City Power Manager ICT Security Application.
Ongoing engagement with accredited providers.
City Power
Johannesburg
EATON
Powering Business Worldwide
NotebookLM

Deployment Readiness.
TSHINGOMBE FISTON.
Engineering | ICT Security | Operational Management
Contact Block
Location: Johannesburg / Pretoria, South Africa
Email: tshingombefiston@gmail.com
Phone: +27 72 529 8946
LinkedIn Profile / Azure DevOps
CSD REGISTERED VENDOR - AVAILABLE FOR IMMEDIATE ENGAGEMENT
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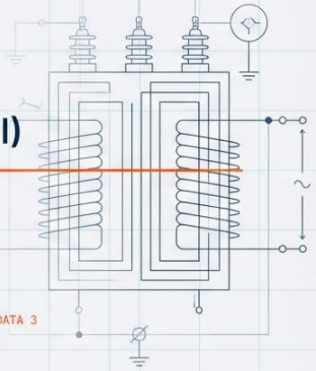
TECHNICAL ENGINEERING PORTFOLIO

COMPETENCY PROFILE: TSHINGOMBE FISTON (TSHITADI)



// 01. ELECTRICAL ENGINEERING DATA 1

// 02. POWER SYSTEMS ANALYSIS DATA 2

// 03. ICT OPERATIONS & SECURITY DATA 3

LOCATION: JOHANNESBURG / PRETORIA, RSA
STATUS: ACTIVE CANDIDATE

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ACADEMIC FOUNDATION & PROFESSIONAL IDENTITY

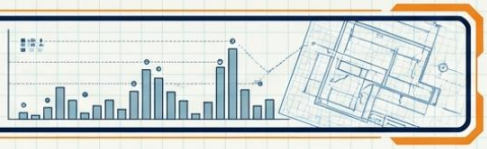
EDUCATION HISTORY

Université de Kinshasa (UNIKIN)
Engineering Certificate (Oct 2020 - Jan 2023)

St Peace College
Engineering & N-Studies (National Diploma Framework)

CERTIFICATIONS & VERIFICATION

CORE FOCUS: Engineering Design, Power Systems Analysis, and Investigation.



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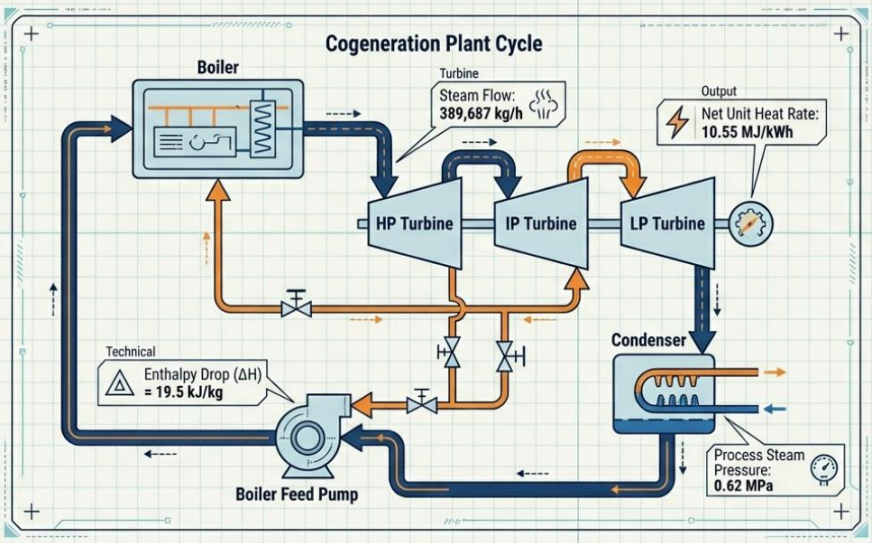
POWER GENERATION & THERMODYNAMICS



KEY COMPETENCIES

- Steam Cycle Management
- Enthalpy & Entropy Analysis
- Break-Even Loading Optimization

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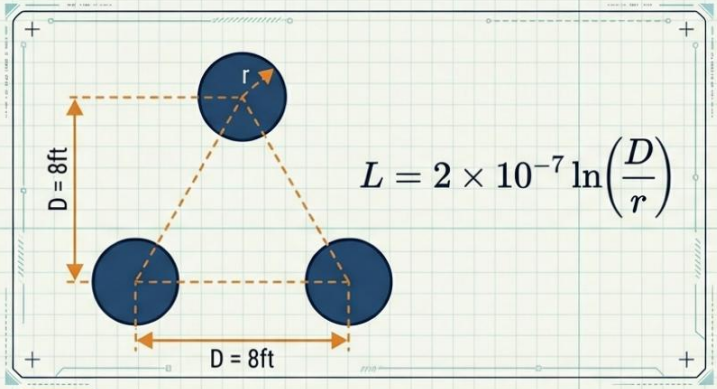
TRANSMISSION & DISTRIBUTION NETWORK DESIGN



$$L = 2 \times 10^{-7} \ln\left(\frac{D}{r}\right)$$

NETWORK PARAMETERS

Voltage Levels	13.8kV / 20kV / 230kV
Frequency	60Hz (377 rad/s)
Analysis Type	Symmetrical & Asymmetrical Faults
Impedance Tool	Z-Matrix Calculation

Core capability: Calculating Geometric Mean Radius (GMR) and Inductance constants for overhead line stability.

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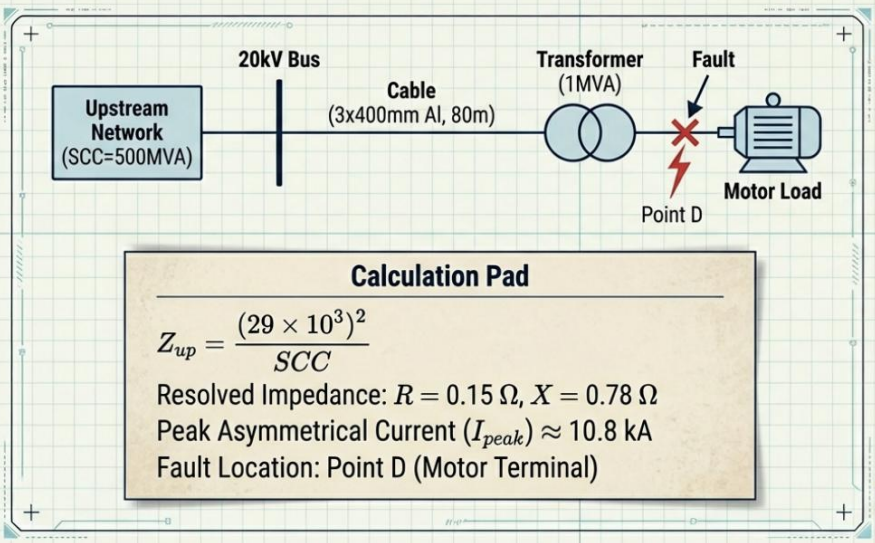
CASE STUDY: 20KV NETWORK FAULT TOLERANCE



Calculation Pad

$$Z_{up} = \frac{(29 \times 10^3)^2}{SCC}$$

Resolved Impedance: $R = 0.15\ \Omega$, $X = 0.78\ \Omega$

Peak Asymmetrical Current (I_{peak}) $\approx$ 10.8 kA

Fault Location: Point D (Motor Terminal)

PROBLEM STATEMENT:

Analysis of a 20kV network supplying a HV/LV substation via overhead line.

Determination of Short Circuit Current (SCC) using Per-Unit methodology.

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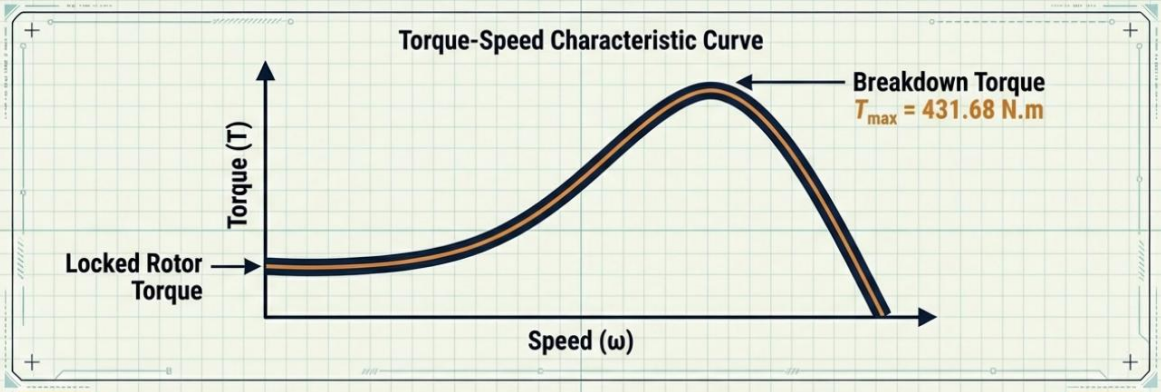
ELECTRICAL MACHINES & DYNAMIC DRIVES



DC & INDUCTION MOTORS	VFD INTEGRATION	TESTING PROTOCOLS
Torque analysis, rotor resistance calculations, and dynamic braking logic (T = k · Ia).	Schneider Altivar Process drive sizing and variable frequency control.	Locked Rotor Tests (15Hz, 24V) and No-Load verification.

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ILLUMINATION DESIGN & PHOTOMETRICS

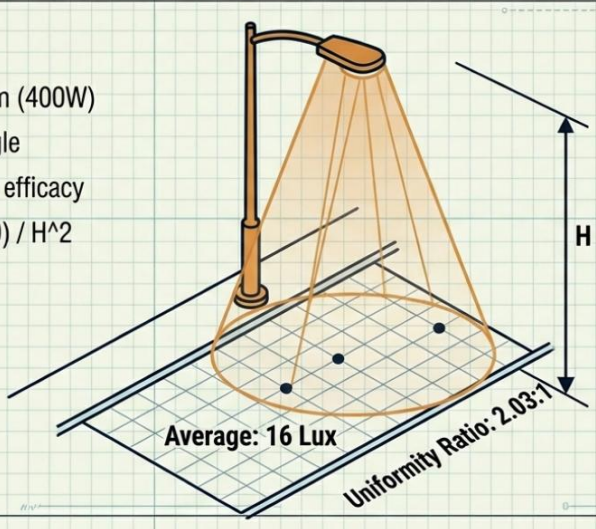
Design Standards

Fixture Type: High Pressure Sodium (400W)

Floodlight Aiming: 63° Vertical Angle

Zoning: 0–70 degrees for luminous efficacy

Calculation Method: E = (Cd)(cos θ) / H^2



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ADVANCED ANALYTICAL METHODS

COMPLEX POWER

S = P + jQ
(Phasor Domain Analysis)

SEQUENCE COMPONENTS

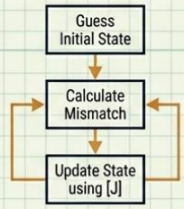
Positive (Z1), Negative (Z2), Zero (Z0) Sequence Impedance for unbalanced faults.

$$\begin{bmatrix} \frac{dP}{d\delta} & \frac{dP}{dV} \\ \frac{dQ}{d\delta} & \frac{dQ}{dV} \end{bmatrix}$$

[J] - Jacobian Matrix for Newton-Raphson Analysis

ITERATIVE SOLVING

Non-linear algebraic equation resolution for load flow studies.



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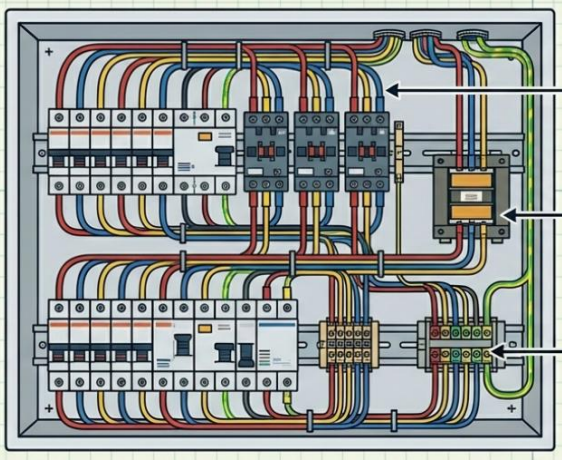
PRACTICAL INSTALLATION & PANEL WIRING



DOL Motor Starters

3-Phase Transformers

Outlet Socket Wiring

FIELD COMPETENCIES

- SANS / Occupational Health Safety Compliance
- Fault Logging & Maintenance Logic
- Cable Pulling & Conduit Sizing (NEC Art 220/430)
- Lockout / Tagout Safety Procedures

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DIGITAL ENGINEERING & AUTOMATION

TOOLCHAIN PROFICIENCY

- Azure DevOps (CI/CD)
- Selenium Automation
- Git/GitHub Workflows
- Java Frameworks

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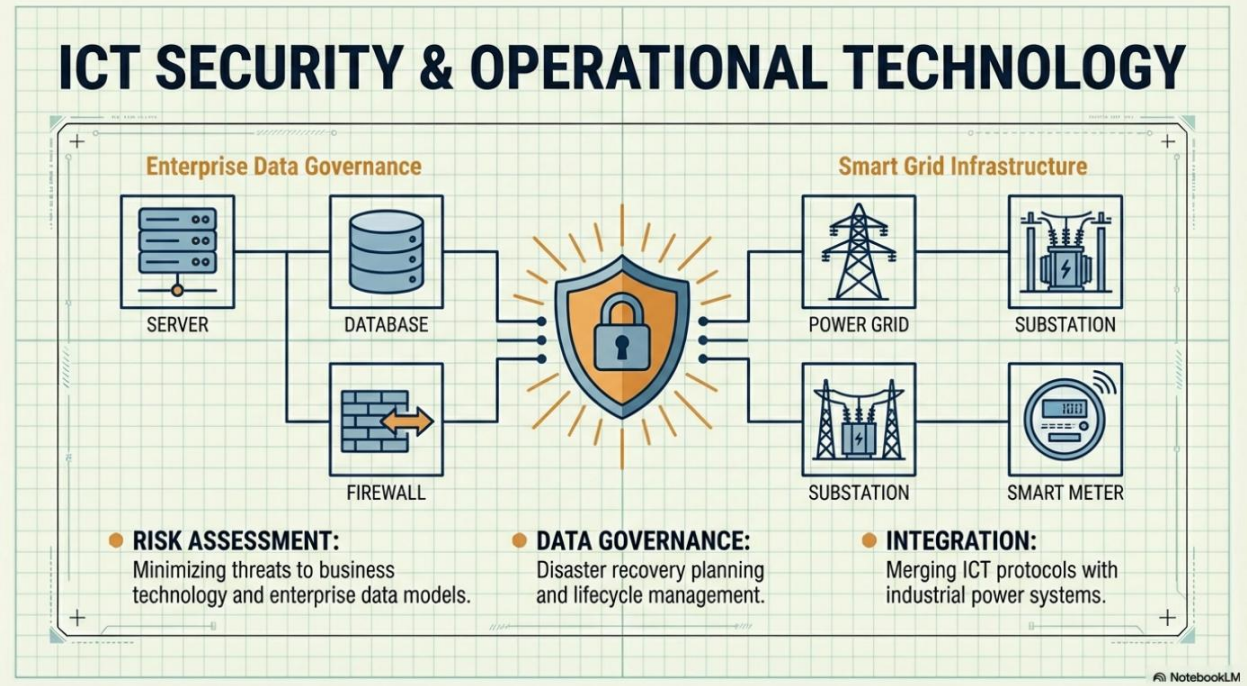
ICT SECURITY & OPERATIONAL TECHNOLOGY
Enterprise Data Governance
Smart Grid Infrastructure
SERVER
DATABASE
FIREWALL
POWER GRID
SUBSTATION
SUBSTATION
SMART METER
RISK ASSESSMENT:
Minimizing threats to business technology and enterprise data models.
DATA GOVERNANCE:
Disaster recovery planning and lifecycle management.
INTEGRATION:
Merging ICT protocols with industrial power systems.
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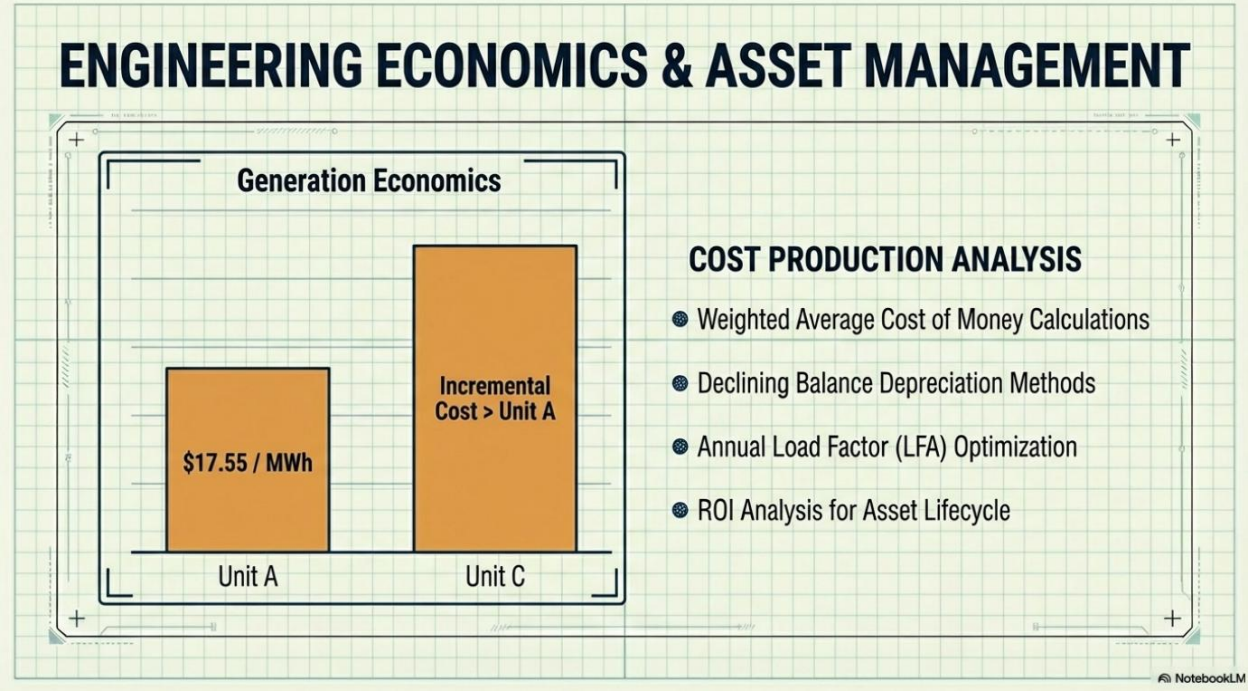
ENGINEERING ECONOMICS & ASSET MANAGEMENT
Generation Economics
$17.55 / MWh
Incremental Cost > Unit A
Unit A
Unit C
COST PRODUCTION ANALYSIS
Weighted Average Cost of Money Calculations
Declining Balance Depreciation Methods
Annual Load Factor (LFA) Optimization
ROI Analysis for Asset Lifecycle
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PROFESSIONAL ENGAGEMENT & CONTINUOUS LEARNING

City Power Johannesburg

ESKOM

MICROSOFT

QCTO / NATIONAL TREASURY

Active participant in industry career days, continuous professional development, and registered supplier on the Central Supplier Database (CSD).

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TECHNICAL APPENDIX: CALCULATION DETAIL

EXTRACTS FROM ENGINEERING LOGBOOKS & DESIGN COMPUTATIONS

Newton-Raphson equations:

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$x_{n+1} = x_n - x_n - f(x_n)/f'(x_n)$$

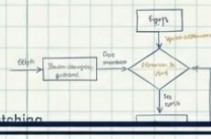
convergence criteria $\varepsilon = 10^{-6}$

Z-matrix:

$Z_{up} = (29 \times 10^3)^2$

$Z_{down} = (14.5 \times 10^3)^2$

Impedance matching:



Steam Turbine Heat Balance data:

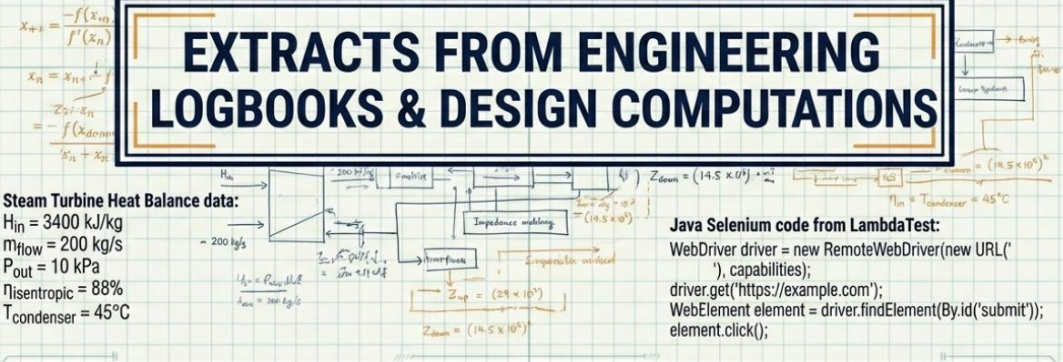
H_{in} = 3400 kJ/kg

m_{flow} = 200 kg/s

P_{out} = 10 kPa

$\eta_{isentropic}$ = 88%

$T_{condenser}$ = 45°C



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m_{flow} = 200 kg/s

P_{out} = 10 kPa

$\eta_{isentropic}$ = 88%

$T_{condenser}$ = 45°C

Java Selenium code from LambdaTest:

```
WebDriver driver = new RemoteWebDriver(new URL('
        '), capabilities);
driver.get('https://example.com');
WebElement element = driver.findElement(By.id('submit'));
element.click();
```

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CONTACT & AVAILABILITY
TSHINGOMBE FISTON (TSHITADI)
ELECTRICAL DESIGN | POWER SYSTEMS | ICT OPERATIONS
Email: tshingombefiston@gmail.com
Phone: +27 72 529 8946
Location: Johannesburg / Pretoria, South Africa
Profiles: LinkedIn & Azure DevOps Available on Request
READY TO DEPLOY FOR WORLD CLASS ENGINEERING CHALLENGES.
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Professional Profile & Technical Competency: Tshingombe Fiston

Summary of academic background, professional experience, and deep technical expertise in electrical engineering and industrial automation.

PROFESSIONAL & ACADEMIC FOUNDATION

St Peace College & Institute Alumni

Completed N-studies (N1-N6) specializing in electrical engineering, research methodologies, and work-integrated learning programs.

Core Professional Experience

Background includes Senior Electrical Project Engineer roles, panel wiring, and industrial design analysis.

Industry Certifications

Holds specialized awards in Panel Wiring Electrical and maintains active inquiries with QCTO.

TECHNICAL MASTERY & ENGINEERING ANALYSIS

Advanced Power System Analysis

Expert in calculating transformer impedance, fault levels (ISC), and voltage regulation for complex grids.

Industrial Automation & Software

Proficient in PLC programming (Schneider Electric), AutoCAD design, and SKM Power Tools for harmonic analysis.

Infrastructure & Maintenance

Specialized knowledge in overhead transmission line geometry, generator grounding, and sustainable energy economic methods.

TECHNICAL CALCULATION DOMAINS & KEY ANALYSIS

Power Networks

Short-circuit peak asymmetrical current and busbar impedance.

Industrial Motors

Torque, slip, efficiency, and dynamic braking time calculations.

Lighting Design

Illuminance levels (Lux/FC) and coefficient of utilization (CU) factors.

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ELECTRICAL POWER SPECIALIST PORTFOLIO: TECHNICAL EXPERTISE & PROFESSIONAL EXPERIENCE

CORE TECHNICAL ENGINEERING COMPETENCIES

Advanced Power Systems Analysis
Expertise in complex calculations for fault analysis, impedence mapping, and transformer performance.

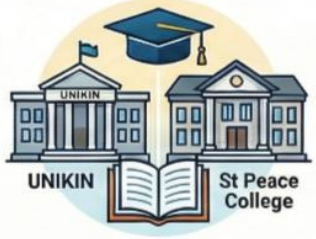
Industrial Automation & Control Systems
Proficient in Schneider Electrio PLCs, HMI programming, and telemetry for industrial processes.

Power Station & Utility Operations
Deep knowiedge of plant generation, substation maintenance, and high-voltage transmission design.

PROFESSIONAL QUALIFICATIONS & CAREER MILESTONES

Certified Electrical Design & Wiring
Holds specific certifications in panel wiring, distribution board design, and motor installation.

Strategic Professional Engagements
Extensive experience history including Jacobs Engineering and documented applications with Eskom and City Power.



Diverse Academic Foundations
Completed multi-level academic programs across UNIKIN and St Peace College in electrical studies.

POWER STATION PROJECT PARAMETERS

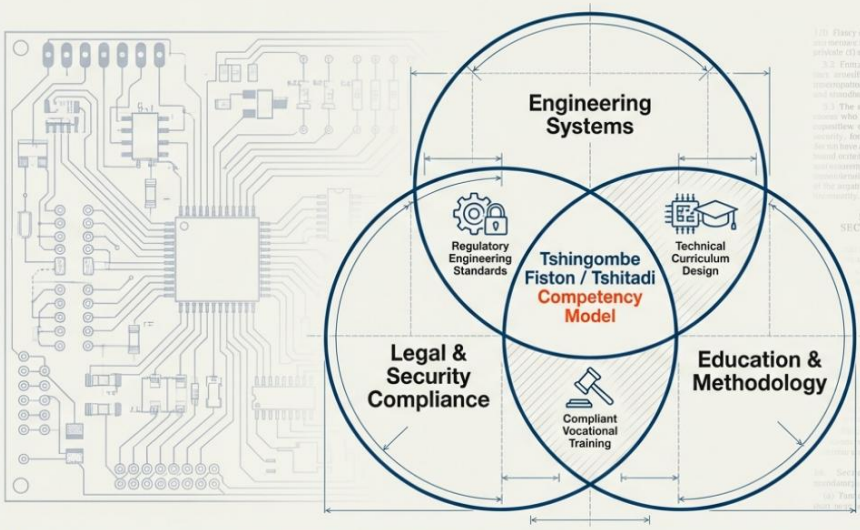
Power Generation
High-voltage testing and thermal fluid machine theory.
Distribution
Low-voltage (L.V.E.D) and Medium-voltage (M.V.E) distribution systems.
Protection
Surge Protection Devices (SPD) and circuit breaker sizing analysis.

NotebookLM

Industrial Editorial Dossier

The Experimental Career Thesis: A Multidisciplinary Framework

Integrating Electrical Engineering, Statutory Security Mandates, and Vocational Pedagogy



Source Context: Research archives from Atlantic Office PC Lab, St Peace College, and Tshingombe Engineering.

NotebookLM

Executive Profile & Scope of Professional Practice

Engineering & Technology

Core Competencies: Electrical, Mechanical, and Digital Systems.

Specialization: Microsoft Azure (AI Solutions, Data Science), Python, C++, and Green IT Infrastructure.

Key Projects: Digital Twin integration and energy efficiency analysis.

Security & Law Enforcement

Statutory Knowledge: Mastery of PSIRA Act 56 of 2001 and Code of Conduct.

Operational Experience: Metropolitan Police IP frameworks, Private Security compliance, and Investigation.

Scope: Dispute resolution and labour relations advocacy.

Educational Quality Assurance

Curriculum Management: TVET syllabus design and Work-based Learning models.

Regulatory Monitoring: NQF (National Qualifications Framework) compliance and Umalusi assessment standards.

Role: Certified Assessor and Moderator.

Key Insight: An experimental career path operating at the intersection of 'Hard' Engineering skills and 'Soft' Legal and Pedagogical frameworks.

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Industrial Editorial Dossier

Pillar I: Statutory Mandates & Regulatory Compliance

Analysis of the Private Security Regulation Act 56 of 2001

Defining Security Equipment & Scope	
Detection Categories	Intrusion detection, X-ray scanning, Bomb detection, Fire detection devices.
Hardware Infrastructure	Alarm systems, Safes, Satellite tracking devices, Security containers.
Communication	Radio procedures and monitoring devices.

Code of Conduct & Improper Conduct

- ⚠ Operating without registration
- ⚠ Deploying unregistered security officers
- ⚠ Failure to meet training/uniform standards
- ⚠ Non-payment of prescribed wages

Key Insight: Establishing a robust legal and operational framework for professional secu

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Industrial Editorial Dossier

Dispute Resolution, Labour Relations & Due Process

The Complaint Resolution Lifecycle

Incident Logging
Nature of complaint: Dismissal, irregularities, certification issues.

→

Statutory Processing
PSIRA Standard Timeframe: 30 to 90 days.

→

Escalation
Labour Court appeals, Office of the Chief Justice.

→

Outcome
Review and Rescission Rulings.

Workplace Advocacy Case Studies

Utilization of the Pension Funds Act and Labour Conciliation processes to address grievances.
Citation: Tshingombe Fiston vs. Employers (Presented as applied legal advocacy precedents).

Key Insight: Navigating the procedural frameworks of labour disputes demands rigorous statutory compliance and strategic escalation protocols.

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Policing Methodologies & Community Safety

PCSO Training Modules

- ✔ Radio Procedures & Communication
- ✔ Evidence Gathering Techniques
- ✔ Crime Scene Management
- ✔ Human Rights & Diversity Awareness

Student Placement Areas

Financial Crime Investigation	Estate & Asset Management	Construction Engineering Security

Concept: Creative Law Response – Strategies to address underlying causes of crime rather than just symptoms.

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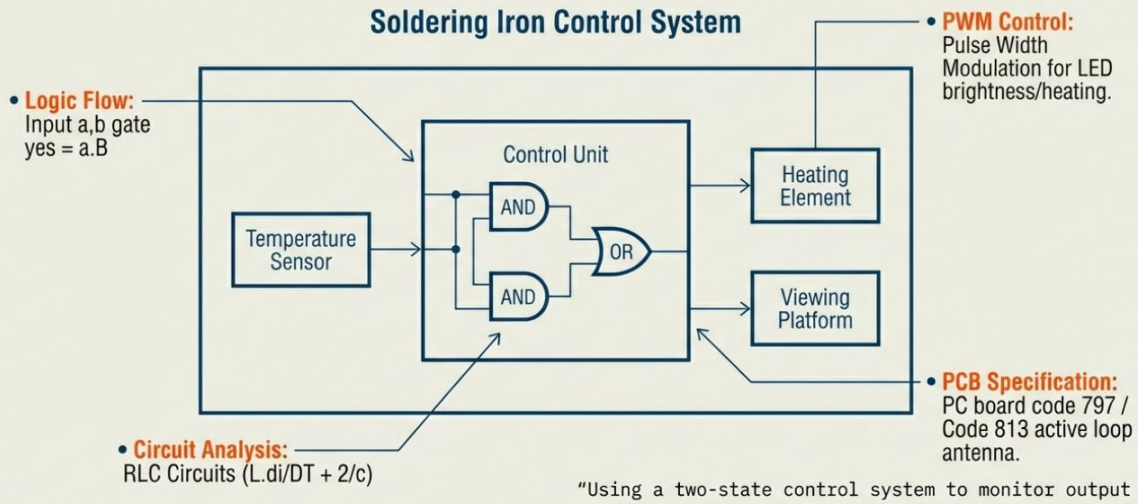
Pillar II: Electrical Engineering & Control Systems



"Using a two-state control system to monitor output and maintain desired temperature thermodynamics."

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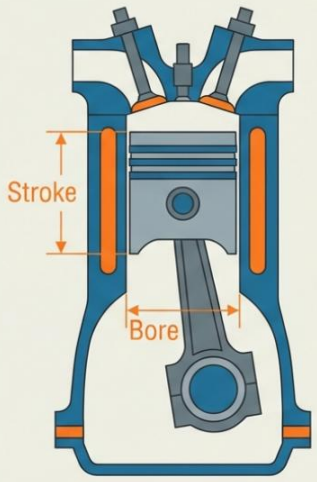
Mechanical Systems & Automotive Specifications

1	Automotive Systems (VW Amarok/Golf)
	• Torque: 400nm @ 1500rpm • Bore/Stroke: 81 x 91.5mm • Compression Ratio: 16.5 to 2 • Injection: Common Rail System
2	Aviation Systems (TBM 700 Turboprop)
	• Engine: PT6A Ratings • Power: 850 shp (Cruise flight power calculations)
3	Thermodynamics
	• Heat Balance Sheet: Brake thermal efficiency calculation • Formula: 0.7854 x Bore x Stroke



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Digital Infrastructure: The 'Digital Twin' & Cloud Computing

Badge Wall

Azure AI Solutions	Generative AI	Python Data Science
Azure Cognitive Search	Microsoft Defender	Security Ops Analyst
GitHub Actions	Docker	CI/CD Pipelines

Technical Highlights

- Coding Languages: Python (Dictionaries, Boolean logic, Loops), C++, SQL.
- Project Management: Visual Studio, Azure DevOps pipelines (yaml trigger: - main).

Hundreds of verified learning modules completed across the Microsoft Learn ecosystem.

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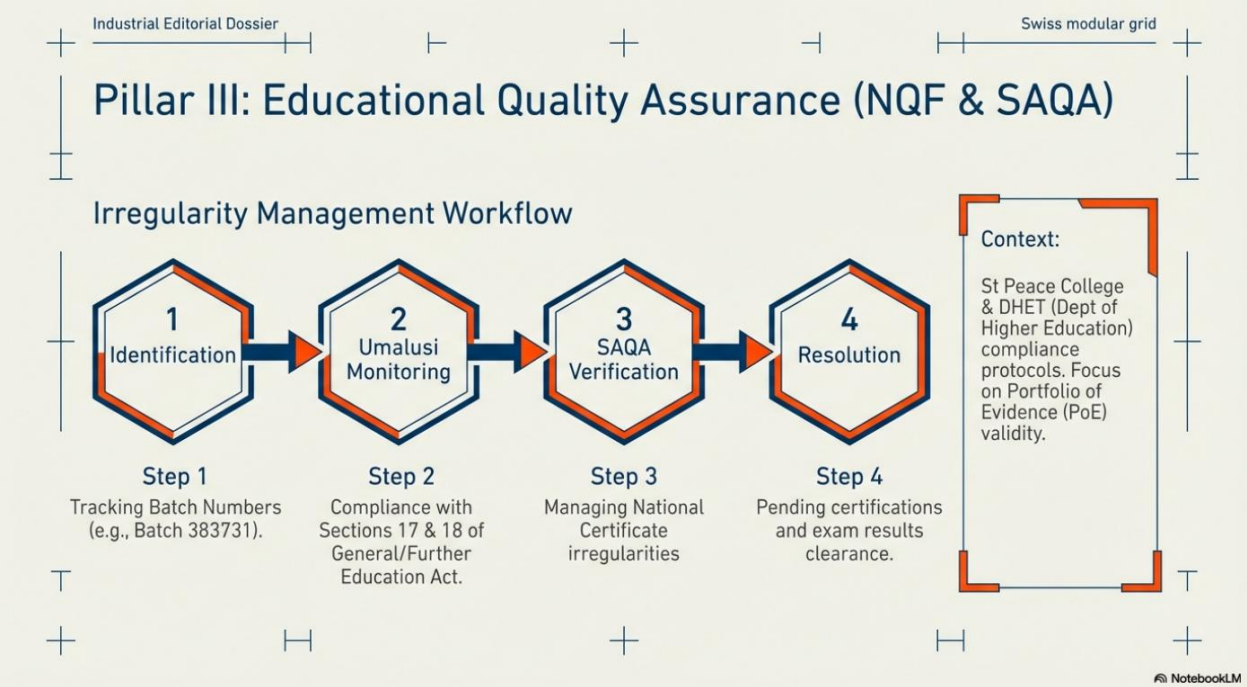
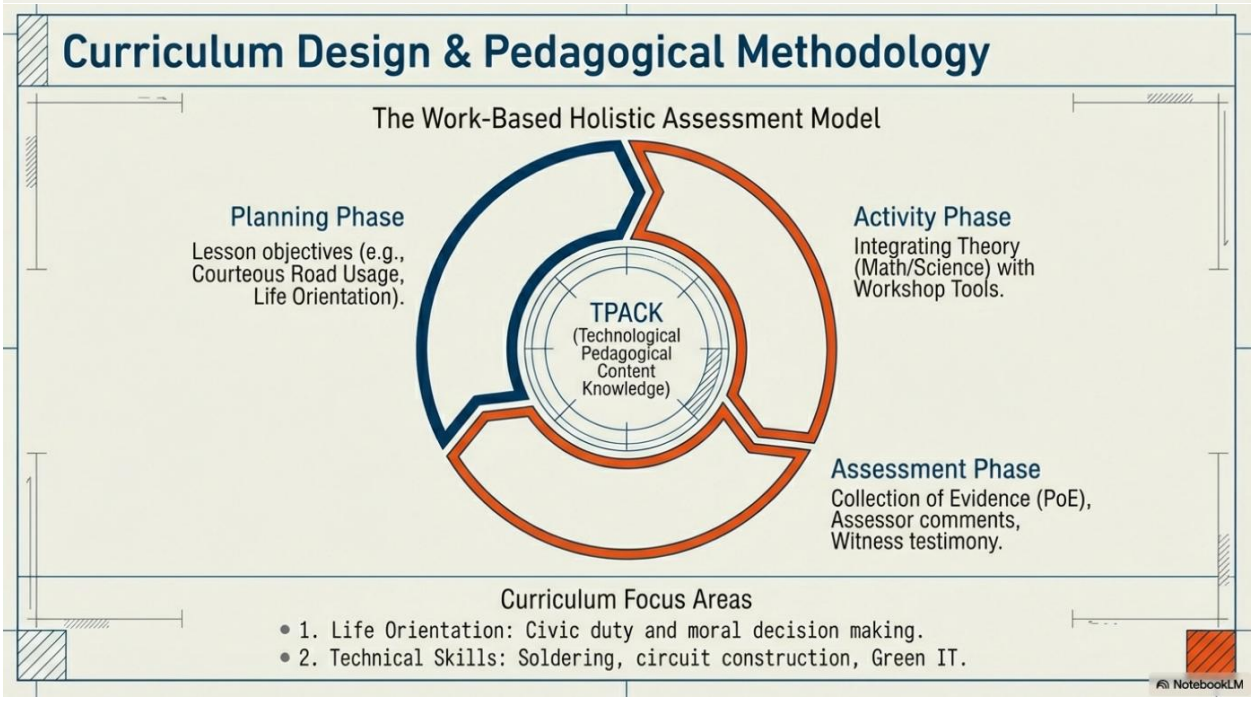
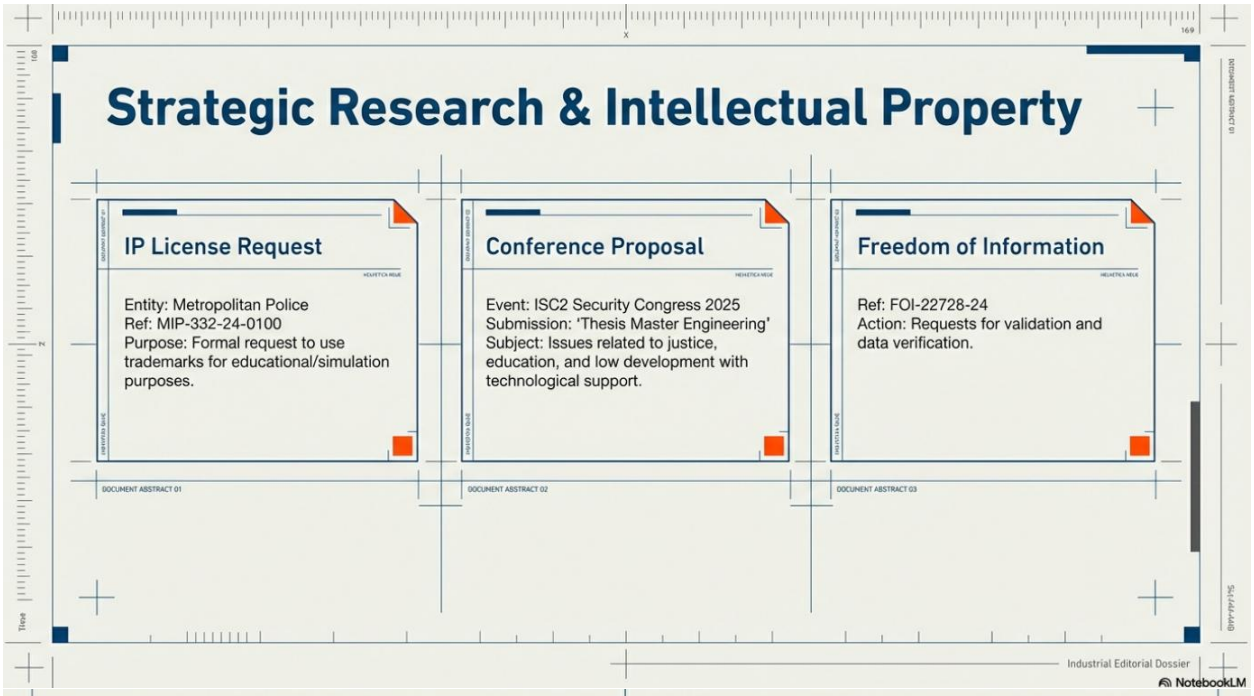
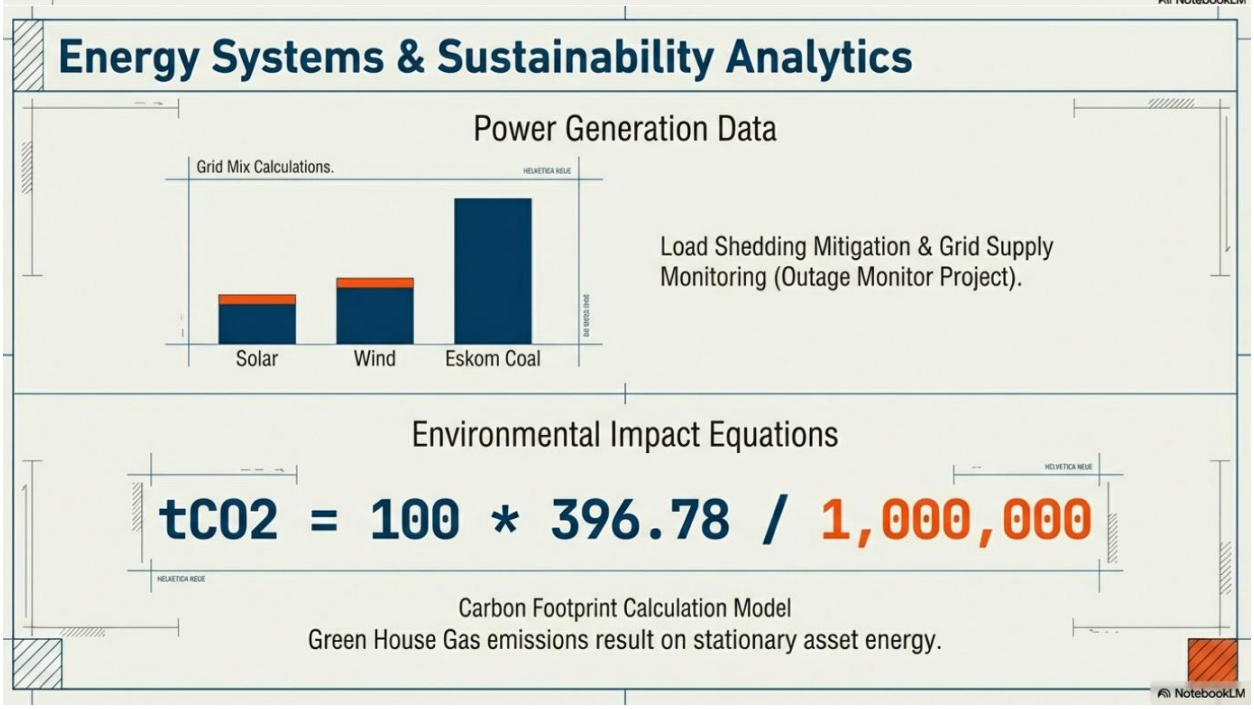
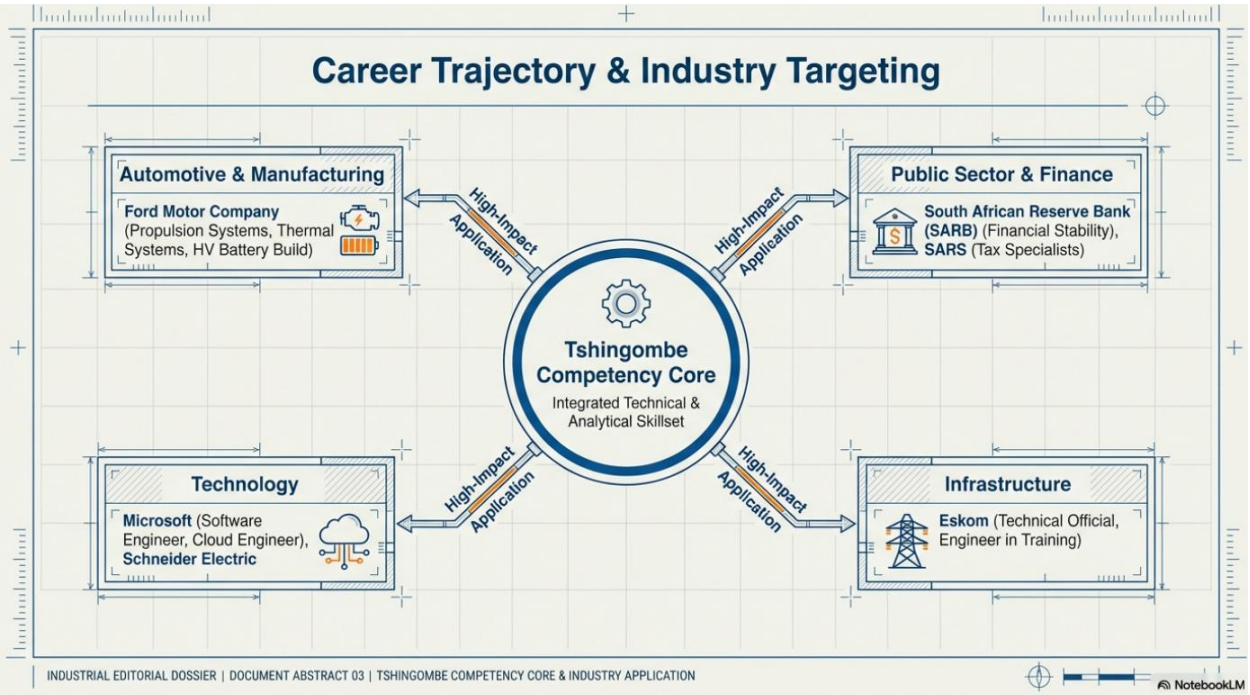

Industrial Editorial Dossier
Swiss modular grid
Pillar III: Educational Quality Assurance (NQF & SAQA)
Irregularity Management Workflow
1
Identification
2
Umalusi Monitoring
3
SAQA Verification
4
Resolution
Step 1
Tracking Batch Numbers (e.g., Batch 383731).
Step 2
Compliance with Sections 17 & 18 of General/Further Education Act.
Step 3
Managing National Certificate irregularities
Step 4
Pending certifications and exam results clearance.
Context:
St Peace College & DHET (Dept of Higher Education) compliance protocols. Focus on Portfolio of Evidence (PoE) validity.
NotebookLM


Curriculum Design & Pedagogical Methodology
The Work-Based Holistic Assessment Model
Planning Phase
Lesson objectives (e.g., Courteous Road Usage, Life Orientation).
Activity Phase
Integrating Theory (Math/Science) with Workshop Tools.
TPACK
(Technological Pedagogical Content Knowledge)
Assessment Phase
Collection of Evidence (PoE), Assessor comments, Witness testimony.
Curriculum Focus Areas
1. Life Orientation: Civic duty and moral decision making.
2. Technical Skills: Soldering, circuit construction, Green IT.
NotebookLM


Strategic Research & Intellectual Property
IP License Request
Entity: Metropolitan Police
Ref: MIP-332-24-0100
Purpose: Formal request to use trademarks for educational/simulation purposes.
Conference Proposal
Event: ISC2 Security Congress 2025
Submission: 'Thesis Master Engineering'
Subject: Issues related to justice, education, and low development with technological support.
Freedom of Information
Ref: FOI-22728-24
Action: Requests for validation and data verification.
DOCUMENT ABSTRACT 01
DOCUMENT ABSTRACT 02
DOCUMENT ABSTRACT 03
Industrial Editorial Dossier
NotebookLM


Energy Systems & Sustainability Analytics
Power Generation Data
Grid Mix Calculations.
Solar
Wind
Eskom Coal
Load Shedding Mitigation & Grid Supply Monitoring (Outage Monitor Project).
Environmental Impact Equations
tCO2 = 100 * 396.78 / 1,000,000
Carbon Footprint Calculation Model
Green House Gas emissions result on stationary asset energy.
NotebookLM


Career Trajectory & Industry Targeting
Automotive & Manufacturing
Ford Motor Company (Propulsion Systems, Thermal Systems, HV Battery Build)
High-Impact Application
High-Impact Application
Public Sector & Finance
South African Reserve Bank (SARB) (Financial Stability), SARS (Tax Specialists)
Tshingombe Competency Core
Integrated Technical & Analytical Skillset
Technology
Microsoft (Software Engineer, Cloud Engineer), Schneider Electric
High-Impact Application
High-Impact Application
Infrastructure
Eskom (Technical Official, Engineer in Training)
INDUSTRIAL EDITORIAL DOSSIER | DOCUMENT ABSTRACT 03 | TSHINGOMBE COMPETENCY CORE & INDUSTRY APPLICATION
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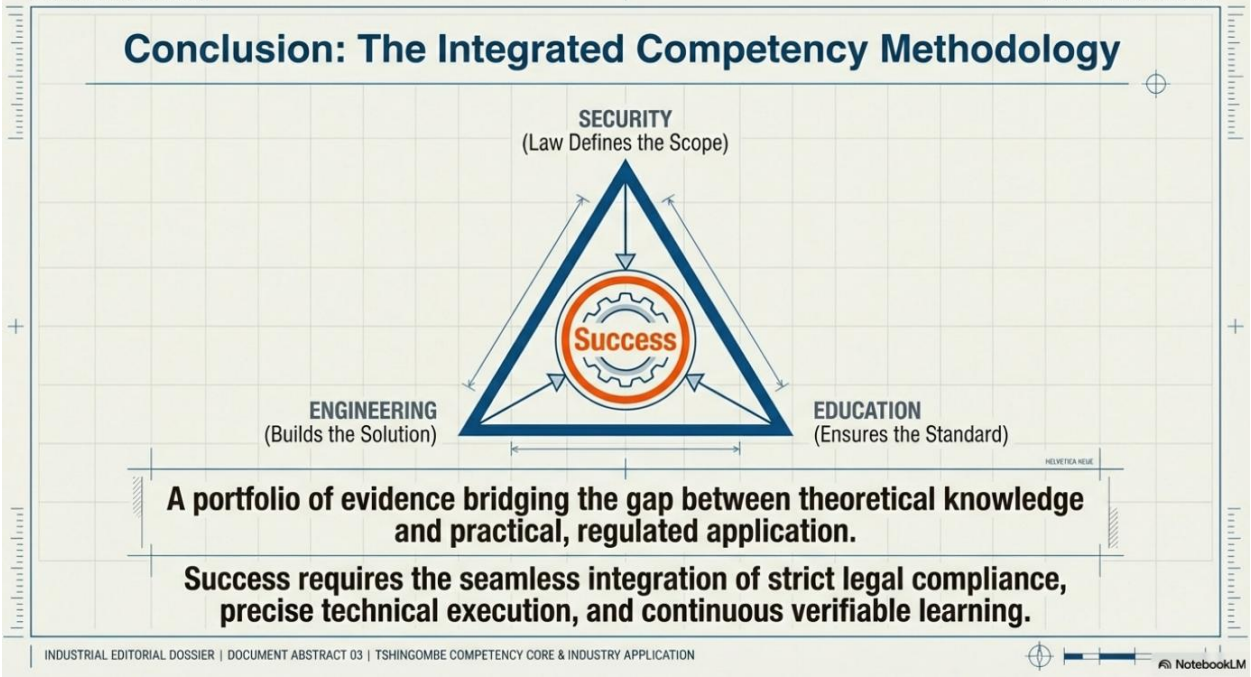
Conclusion: The Integrated Competency Methodology
SECURITY
(Law Defines the Scope)
Success
ENGINEERING
(Builds the Solution)
EDUCATION
(Ensures the Standard)
A portfolio of evidence bridging the gap between theoretical knowledge and practical, regulated application.
Success requires the seamless integration of strict legal compliance, precise technical execution, and continuous verifiable learning.
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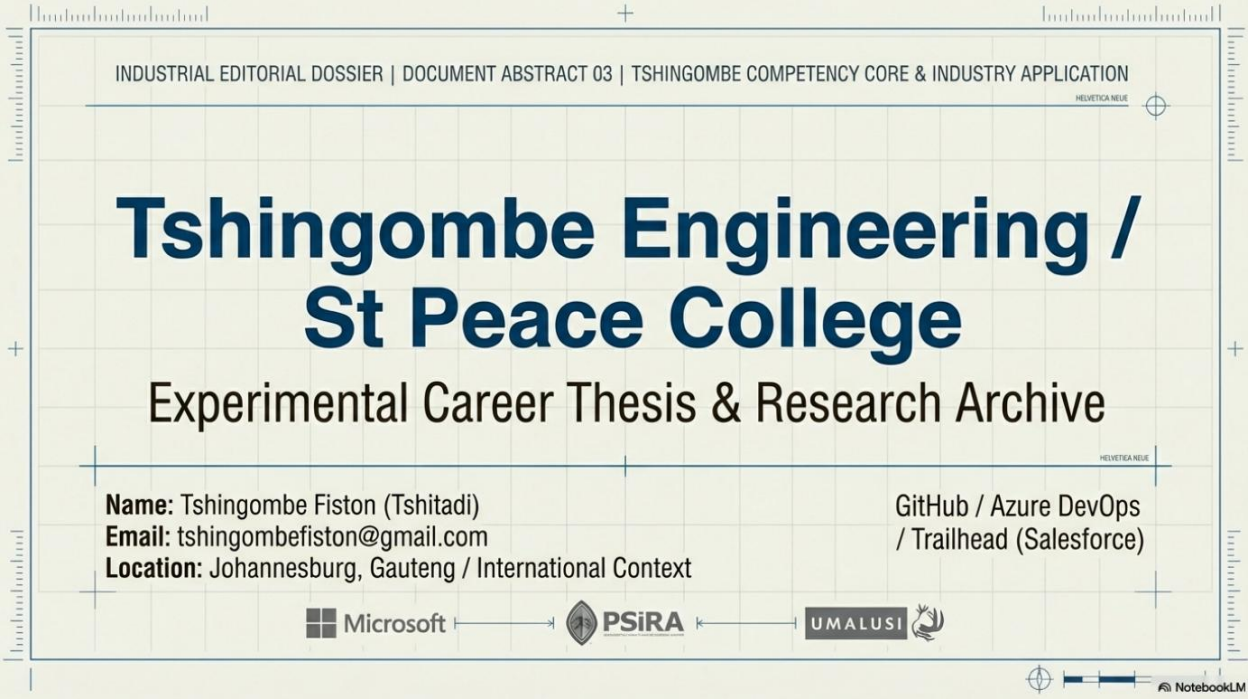
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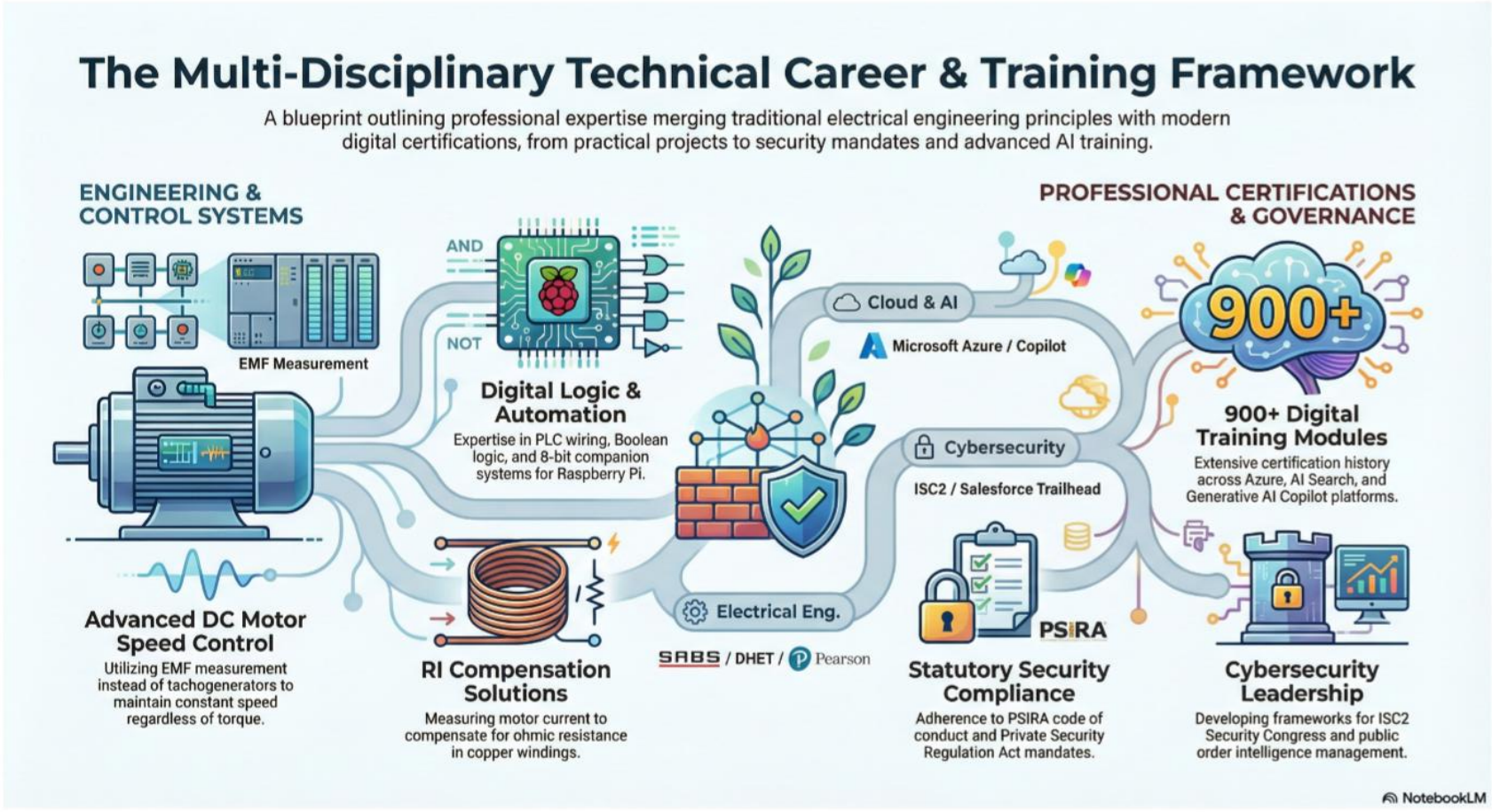
The Multi-Disciplinary Technical Career & Training Framework

A blueprint outlining professional expertise merging traditional electrical engineering principles with modern digital certifications, from practical projects to security mandates and advanced AI training.


ENGINEERING & CONTROL SYSTEMS
PROFESSIONAL CERTIFICATIONS & GOVERNANCE
AND
NOT
EMF Measurement
Digital Logic & Automation
Expertise in PLC wiring, Boolean logic, and 8-bit companion systems for Raspberry Pi.
Cloud & AI
Microsoft Azure / Copilot
900+
900+ Digital Training Modules
Extensive certification history across Azure, AI Search, and Generative AI Copilot platforms.
Cybersecurity
ISC2 / Salesforce Trailhead
Electrical Eng.
SABS / DHET / Pearson
PSIRA
Advanced DC Motor Speed Control
Utilizing EMF measurement instead of tachogenerators to maintain constant speed regardless of torque.
RI Compensation Solutions
Measuring motor current to compensate for ohmic resistance in copper windings.
Statutory Security Compliance
Adherence to PSIRA code of conduct and Private Security Regulation Act mandates.
Cybersecurity Leadership
Developing frameworks for ISC2 Security Congress and public order intelligence management.
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